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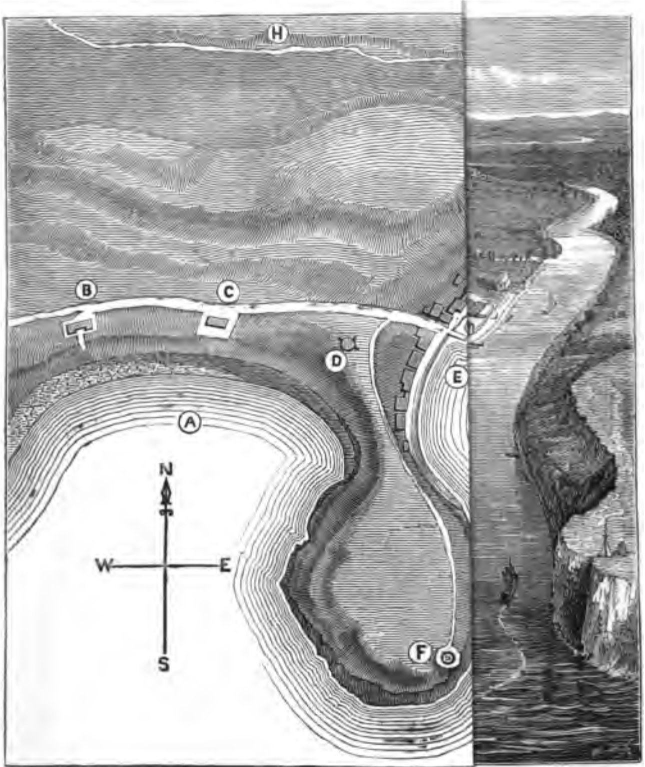

Reference.

A Seaforth Cove.
B Coast-Guard Station.
C Seaforth Cottage.
D Windmill.

E Chalkton
F Chalkness
G East Cliff.
H Brook.

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A FIRST GEOGRAPHICAL READING BOOK.

BY

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AUTHOR OF "THE TEACHER."

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PREFACE.

THE following pages are published in the hope that their use as reading lessons may enable young teachers to take pleasure in teaching, and children in learning Geography.

If children's memories be burdened at the outset with definitions of things unknown, they are likely to imbibe a distaste for what should be a most interesting and improving study.

It is assumed that at every reading a globe and a map of the world will be at hand for constant reference, and that the teacher having studied each lesson beforehand will freely illustrate on the blackboard. He will of course draw, 1st, the two plans described in the text; 2nd, a plan of his school premises; and 3rd, a map of his own town or village and its surroundings. He will do well also to have a tray with clay and sand wherewith to make raised models of hills, valleys, plains, table-lands, &c., &c.

A child's feeling of awe and wonder on first viewing the earth as a planet may be profitably enlisted to awaken in his mind an interest in the details of its surface.

It has been thought better not to insert woodcuts in the text, as too often they distract children's attention from what they are reading, and tempt teachers to spare themselves the trouble of illustrating their subject.

The greater part of the book is put in the form of dialogue, because it has been found that children learn to read more naturally by these than by any other means.

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GLIMPSES OF THE GLOBE.

GLIMPSES OF THE GLOBE.

CHAPTER I.

THE POINTS OF THE COMPASS.

MARY and Charlie Seaforth lived in a white-walled, red-roofed cottage on the south coast of Kent. When Mary was ten years old, and Charlie only fifteen months, their mother died. Happily for the little orphan boy, his sister, besides having a good, kind heart, was quick with her hands, clean and tidy in her ways, and ever ready to make herself useful. She nursed and fondled her baby brother, and did for him much that a good mother would have done. As their father was often away from home for days together, the two children were left very much to themselves.

The cottage stood on a chalk down sloping gently towards the beach of a snug cove. On the east of the cottage the down rose to a ridge, on the crest of which stood a windmill. Just behind the ridge lay the fishing village of Chalkton. Past it flowed a little tidal river, whose mouth formed Chalkton harbour—a safe refuge for small vessels. Further east, on the other side of the river, rose a high cliff, topped by a flag-staff and a look-out cabin.

It took the children about ten minutes to walk from the cottage to Chalkton Quay. There they loved to stand watching the tide come in. Fighting, inch by inch, foot by foot, the salt water of the sea pushed back the fresh water of the river. Little by little the rising tide floated the boats that had lain basking on the muddy river-bed, as if glad to rest from struggles with wind and wave.

When the children were returning home from the village, they sometimes turned to the left at the windmill, and walked round Chalkness Down. This was a pear-shaped tongue of land jutting out southwards into the sea. Its headland sheltered Chalkton harbour from south-westerly gales. The ridge on which the windmill stood had the river-mouth below it on the east, and the sea on its west. It was the stalk of the pear. At the south-east of Chalkness, on the farthest ledge of the headland, stood a lighthouse. Here Mary and Charlie loved to sit watching the milky water of the river mingling with the green water of the sea.

One summer evening, when Charlie was eight and Mary seventeen years old, as they walked homewards from the lighthouse, along the western ridge of Chalkness, they amused themselves by watching their own shadows, thrown eastward by the afternoon sun setting across the cove. Finding Mary's shadow longer than his own, Charlie stepped a little further inland. He then called out,—

"Look, Mary, my shadow is longer than yours;" and he lifted up his arms to make his shadow still longer.

As he stood thus, with his back to the sun, on ering his arms, he saw his shadow forming a cross on the ground, and called to his sister to look.

"Why, Charlie," said she, "you stand like a finger-post or a weather-vane, with only two arms—one pointing south, the other north."

"Well, then," said he, "I'll do what no finger-post can do. I'll turn right round, and so make north and south change places!

"Why, you silly boy," said Mary, "you've only changed the hands pointing north and south. As you stand now, looking west, your left hand points to the south, your right hand to the north. As you stood before, looking eastwards, your right hand was pointing south, your left hand north."

"I know that, Mary; I was only joking. You forget how often I have been out in the cutter with Uncle George, and stood by the man at the helm, as he steered by the compass. I should like to have a little pocket-compass of my own to carry about with me. Then I should know which way I was going in my little walks over the downs."

Mary said nothing in reply, but made up her mind to save up money to buy her brother a compass for his coming birthday.

CHAPTER II.

SUNSHINE AND SHADOW.

UNCLE GEORGE, of whom the children spoke, was an officer of the coastguard. The station lay somewhat to the west of Seaforth Cottage. There lodged a few brave and tried seamen, who had served many years on board ships of war. They were posted here to see that no smuggling went on, and also to help vessels in distress. The snug cove, though open to the south, was sheltered from every other wind, and afforded good shelter to the boats of the coastguard.

When storms were raging out at sea, the children would sit at the window watching the "white horses," as they called the foaming billows, chasing each other madly along the channel outside the cove. Near the cottage the water was seldom much storm-tossed. It seemed to Mary as though the tiny bay held out a pair of loving arms to welcome any tired waves that chose to turn in, seeking rest. When she saw the angry crests of the waves without, she loved to watch the smooth swell of the tide licking the sand and pebbles at her feet. It seemed as if the wearied water were thanking the friendly shore for its kindly welcome, and falling asleep in its arms, as her little brother used to fall asleep in hers.

Near the cottage was a long plank resting on a heap of large stones called boulders. One day, as Charlie and Mary sat, one at each end of this plank, playing at see-saw, Charlie said,—

"Mary, have you noticed how the sun plays at see-saw with the shadows?"

MARY. What *do* you mean, Charlie?

CHARLIE. Why, in the morning, when the sun rises, the windmill and our cottage throw long shadows on the ground; but, as the sun mounts higher and higher, the shadows grow shorter and shorter. While the sun is moving away out from the shore and over the sea, the shadows keep hiding further behind the houses, as though playing hide-and-seek or bo-peep. When the sun begins to sink down in the west, the shadows again grow longer. So it seems to me that sun and shadow play at see-saw; as one goes up, the other goes down; as one goes this way, the other goes that.

MARY. What a funny idea, Charlie.

CHARLIE. Yes, I know it is silly talk; but still I should like to know the meaning of some things that I have noticed.

MARY. Well, here comes Uncle George. Ask him.

As the children were talking, up came Uncle George, with his glass under his arm. After saying a few kind words to his niece Mary, he turned to his little nephew. He saw plainly that Charlie was very eager to say something.

UNCLE. Well, Charlie, what is it?

CHARLIE. Why, uncle, I want to know about the sun. In the morning it is always somewhere on the windmill side. In the forenoon it goes out over the sea. In the afternoon it begins to sink, till it sets somewhere behind your station.

UNCLE. What you want to know will take me a long time to make clear to you. Indeed, I do not feel sure that I shall be able to put it all so that you can easily understand it; but I'll try. That is your bed-room window just above the door, is it not?

CHARLIE. Yes, uncle, that is my room facing the sea; Mary's bed-room window looks towards the windmill, and father's has two windows—one facing the sea, the other looking towards the coastguard station.

UNCLE. Then your bed-room window faces the south, Mary's the east, *one* of your father's, like yours, the south, the other the west. What time do you wake in the morning, Charlie?

CHARLIE. About seven o'clock, sooner or later. When the sun is shining, I always know the time by a row of red wafers which I have stuck on the wall.

UNCLE. I shall have but little trouble in teaching you, then, I see, as you have already begun to teach yourself. How came you to think of sticking wafers on the wall?

CHARLIE. Why, when I was lying ill in bed so many days last March, I used to notice that the sunlight flashed always in a bright line on the wall to my right as I lay awake in the early morning. Later on I saw it slide down the wall to the floor, then crawl along it all day. At noon it was always just below and in front of the window. In the afternoon the light went crawling along towards the other wall, crept up, and became thinner, till the last streak went out. As soon as I could leave my bed, I stuck rows of wafers on the walls, and brass nails on the floor, to mark where the sunshine fell at different hours of the day.

CHAPTER III.

DAY AND NIGHT.

UNCLE. Let me think; it was the end of March when you were well enough to come down. Have you noticed your marks lately?

CHARLIE. Yes, and I can't at all make out what I find. The sunshine now no longer reaches my old marks. In the mornings and the evenings the light falls lower down the wall than the upper wafers. At dinner-time it does not come nearly so far into the room as the brass nails.

UNCLE. I daresay you have noticed, Charlie, that the days are now far longer than they were when you lay on your sick-bed last March. By-and-by I shall try to make you see why the days are now so much longer than they were then. But before I can hope to do that you have much else to learn. Have you made any fresh marks on the walls and floor of your room lately?

CHARLIE. Yes, uncle; I made a fresh set only yesterday.

UNCLE. Well, then, as you have begun to teach yourself by noticing all this, my task will be far easier than I thought it would have been. At what hour in the afternoon does the sunlight leave the last row of wafers on the east wall of your bed-room?

CHARLIE. At five o'clock. I notice it because I often go up to wash my hands for tea at that hour.

UNCLE. Of course you know what those letters N.E., S.W., just below the weather-vane, mean, do you not?

CHARLIE. Yes; because I have often heard you and father say, when you looked up at them, "The wind is in the north to-day," or south, east, or west.

UNCLE. Well, look up and tell me what the wind is now? You see the arrow-head is not pointing exactly to either letter.

CHARLIE. No. It points half way between the S. and the E.

UNCLE. True; that shows that the wind is from the south-east. Suppose the arrow were to turn right round, what wind would that show?

CHARLIE. Let me see; it would then point between the N. and the W.—north-west.

UNCLE. Right. Now your bed-room window and the front of your father's cottage face due south. So the back of it faces—which way?

CHARLIE. Due north.

UNCLE. Well, towards the end of March the sun rises due east at six, and sets due west at six. It was about then that you first took to sticking wafers on the wall. You will remember the date more easily when I remind you that your sister Mary's birthday is on the 25th of March, sometimes called Lady Day. At that time of the year the sun is up for twelve hours, from six in the morning to six in the evening. Clouds often hide it from sight, but it is there all the same, though we can't always see it. Every day since March the sun has been rising somewhat earlier and setting somewhat later; rising daily further north of east, and setting further north of west.

CHARLIE. True, uncle; I have noticed that the sun now shines in at our back windows early in the mornings from four to six, and again in the evenings from six till eight. That is just what I want you to tell me all about, if you will kindly take the trouble.

UNCLE. Well, before I begin, I will first tell you what you will find if you go on marking the sunlight on your bed-room floor. It is now midsummer. The days are now as long, and the nights as short, as they ever are in these parts. Every day after this the sun will rise somewhat later in the morning, and nearer to true east, and will set somewhat earlier in the afternoon, and nearer to true west. In three months' time, that is towards the end of September, you will find your old March marks true once more. The sun will then rise due east at six, and set due west at six. Day and night will be then once more each of the same length —twelve hours. It will be easy for you to remember all this, because your own birthday falls on the 23rd of June, which is about midsummer, and your father's falls on the 22nd of September. Do you remember last Christmas Day, Charlie?

CHARLIE. That I do. It snowed and froze hard, and I went about all the forenoon taking dinners to some poor sick folk. I remember it grew dark at four o'clock.

UNCLE. True; at Christmas we have only some eight hours day and sixteen hours night. Now that it is midsummer, we have some sixteen hours day and eight hours night. Don't you remember that then the sun rose over the lighthouse a long way south of east, and mounted but a little height in the sky, and set south of west out there, over Dungeness?

CHARLIE. Yes, uncle; I remember. It used then to shine at mid-day on the back wall of my bed-room, instead of on the floor below the window, as it does now. I remember, too, that I could see it rise and set too, from my bed-room window.

UNCLE. Very well. Now let us put together all that you have noticed. You have seen that the sun always rises on the east side of the sky, and sets on the west side; that in spring time it mounts higher in the sky than it does in winter, and in summer higher still. All this you have seen for yourself.

Every day, from midsummer to midwinter, the sun will rise later and set earlier, and further south of true east and west, and mount to a less height in the southern sky. After midwinter it will rise earlier, and set later and further north of true east, and will daily mount higher in the sky. Noontide shadows are shortest at midsummer, and longest at midwinter. Nights, like noontide shadows, are longest in winter, when days are shortest, and shortest in summer, when days are longest.

What we have to find out is, first, why we have day and night, or sun or no sun; and next, why we have short days with long nights, and long days with short nights.

CHAPTER IV.

THE EARTH'S SHAPE.

UNCLE. Now you are not the first little boy that has noticed all this, and longed to know the reason. Ever since men were made they have tried to find out these things. Till little more than two hundred years ago, they sought in vain to learn what you shall soon know. They knew but little of the earth's surface. No one had gone far without finding sea or land beyond the farthest point that he had reached. They saw the sun rise and set daily. They noted the stars rising and setting, and not the same stars at the same time two nights running. They saw that a year passed before both sun and stars were once more in just the same places. They racked their brains in vain to find out what it all meant. What they thought about it I may some day tell you, but just now, I see, you are yearning to learn the truth.

Well now, Charlie, I have a great surprise for you. The sun—which I daresay you, like many of old, take to be a white-hot plate wheeling round the earth—is a huge ball, more than a million times larger than the earth on which we live. The earth, itself a ball, placed beside the sun, would look less than a tiny flower seed beside an orange. The sun *seems* to be going round the earth, because the earth is always rolling, or turning round on itself. As it spins it carries us along on its surface. Yes, it carries the land, the sea, and all that therein is, out of sunlight into darkness, out of day into night, and so on, for ever.

CHARLIE. What! spins round like a top?

UNCLE. Yes. Do you remember when you went in the train last month, how you thought all the trees were running to meet the train in which we sat. At first you could hardly believe that our train was moving.

CHARLIE. I remember that quite well; I remember, too, at one of the stations father had got out, and when another train alongside of ours began to move off, I thought it was our train starting and that poor father had been left behind. I was so sorry and frightened. But after all I don't see what that has to do with the earth's spinning round.

UNCLE. Why, as the trees then seemed to be running to meet our train, so the sun seems to us here on earth to be going round us from east to west. It is really just the other way. Indeed, now that I have told you the sun is more than a million times larger than the earth, you would hardly expect the greater to go round the less.

CHARLIE. No, of course not. So then, the earth is spinning from west to east?

UNCLE. That is it. But there is much more yet to be learnt. That will not show you why the sun rises and sets in different quarters at different times of the year, nor yet why it mounts high in the heavens in summer time and very low in winter. Before I can even attempt to make you understand all that, I shall have to show you a little model of the earth, and let you watch that model moving like the earth. I told you just now that the earth is a huge ball. Strange as this may seem at first, I have here the means of showing you something that may help you to believe the earth to be round. If we were living inland you would have to take my word for it. No one can see the roundness of the earth inland, because of its uneven surface. Yonder is a brig which put to sea an hour ago, and is slowly sailing southwards. Take my glass and look at her. What do you see?

CHARLIE. I see her black hull and all her sails set.

UNCLE. Now lend *me* the glass, that I may sweep the sky-line, and perhaps find another vessel homeward bound. Yes, there is one a little to the west of the brig. Take the glass and tell me what you see.

CHARLIE. I see no hull, but three sails one above another, and the mainsail looks as if it were floating on the top of the sea. Oh, now I see a thin black line rising up; now it is growing thicker; now I see the hull; now the gilded figure-head glistening; yes! and now the white foam under the cut-water.

UNCLE. And now turn your glass once more on the outward-bound brig.

CHARLIE. Why, its hull is gone, and its mainsail too! Yes, and the other sails also are even now going down into the sea. She must surely be sinking!

UNCLE. Well now, if the surface of the sea were flat, you would see the whole of the outward-bound brig growing less and less as she sailed further and further away. You would not lose sight first of the hull, then of the main-sails, then the top-sails, then the topgallant sails, then the sky-sails. And so, too, you would see the hull of a coming vessel as well as the sails, if the sea were flat. Do you not remember when you have been out for a sail in our cutter what part of the coast you have always seen last? Was it your cottage?

CHARLIE. Oh no; I always see the high ridge of the Downs long after I have lost sight of our cottage. And when we are sailing home I see the ridge of the Downs before I can see anything near the shore. That, too, must be why you always send one of your men up the East Cliff when you think some ship may be passing out at sea. The higher one is up, the further one can see.

UNCLE. Well, all this is because the surface of the sea is round, not flat. We cannot see round a curve. Just give me your toy ship, and stand on the other side of the flagstaff mound. There, now you can look along the top of the mound where I set your toy ship. Now watch while I draw it down. You can't see the hull now, because the top of the mound hides it from your eye, now you have lost sight of the lower sails, now of the top—just what you saw out at sea through the glass. Watch again, while I push your toy up the mound again. Now you see the sails, now the hull—again just what you saw through my glass. The round top of the sea hides ships and anything else that lies behind it. Of course the sails of a ship may peep over the round surface of the sea, and be seen, while the hull is still hidden by the curved water. So, too, high hills can be seen above the round sea-top; while the low shore is still hidden by it.

CHARLIE. I understand all that. But, dear me! how silly of me not to have remembered before that you have sailed all round the world. Somehow, when I hear things, I don't always think what they mean till something fresh leads me to think about them. It did not strike me that the earth must be a ball because men have sailed all round it.

UNCLE. No; for that would not prove its shape to be like a ball, for a fly can walk round a square box. If the earth were only round like a clock-face—a flat round—one might sail round it.

CHARLIE. Why, so one might. But, uncle, if the earth is round like a ball, how is it that ships don't tumble off when they get to the other side of the world?

UNCLE. That always used to puzzle me, too, when I was a little boy. There are large countries like our own on every side of the earth. Men, women, and children, live there just as we live here. When children *there* are first told that there are men living with feet turned towards their feet, and with heads pointing the other way, they too wonder, as you do, why the others don't fall off. If you were to sail day after day round the world, as I have done, you would see the sky overhead, and the water underneath every day. You would then cease to wonder why folk do not fall off. Wherever you are on the earth, you see the sky overhead and the land and water underneath. Trees, houses, ships, and people, everywhere seem upright. We are all drawn to the earth itself, we and everything on the face of the earth. We could not fall off if we tried to do so. How high can you jump, Charlie?

CHARLIE. Only as high as my waistcoat pockets. But, dear me, uncle, what a silly little goose I have been not to remember what you told me, that the earth is always rolling. Had I thought of that I could never have asked such a foolish question as why ships do not fall off. Of course if the earth as it rolls carries us along on its surface, we must all seem sometimes up and sometimes down. When we are up, men on the other side of the earth must be down, and when they are up we must be down. Now I have never yet felt upside down when I have been running about, or standing or sitting. So I might have known that neither do folk in other parts of the earth ever feel upside down.

UNCLE. I'm glad to find you think over what I tell you.

CHAPTER V.

THE EARTH'S SURFACE.

A FEW days after the above talk Uncle George met Charlie, and said, "Many happy returns of the day, Charlie! I have brought you here a little birthday gift, from which you will learn all that you were asking me the other day, and much more too. I spoke to you of a model of the earth. Here is one for you. It is called a globe, which means a ball."

CHARLIE. Thank you very much, dear uncle. You could not have given me anything I should have liked so much. Why, it moves round when I touch it.

UNCLE. Yes, or it would not be of much use for showing how the earth spins. You see it is held slantwise by two brass pivots which bite it loosely above and below, but allow of its being turned round. The meaning of its being aslant instead of straight you shall learn in good time. Just now I should like you to look over the globe and see what there is on its surface. Turn it round, and look it well over.

CHARLIE. I see that most of it is coloured pale green.

UNCLE. Yes, that is meant for the water of the sea.

CHARLIE. What! does the sea go all over the earth like this?

UNCLE. It does indeed; there is nearly three times as much sea as there is land on the face of the earth.

CHARLIE. And whereabouts on it is *our* sea?

UNCLE. You will have to look very close to see it at all. It is this narrow streak near that red patch. That is the island on which we live.

CHARLIE. Island! why do you say island? Why don't you say country?

UNCLE. Well, I might have said country; but this globe is not large enough to show our country marked apart from the rest of the island. Oh, but perhaps you don't yet know that we live on an island. This is our island home, Great Britain. True, it is a large island; but there are other islands far larger. Here, for instance, are two much larger islands, one marked Borneo; and here is yet another, Madagascar.

CHARLIE. Ah, now I begin to see what you mean by an island. All these patches have the green right round them. So they are all surrounded by sea.

UNCLE. To be sure; and a large island may contain more than one country, and many people, each with its own laws and government. There were once many kingdoms in Great Britain. There are still two countries; the northern called Scotland, the southern called England and Wales. Travel whichever way you will in an island, if you keep straight on, you must at last come to the sea.

CHARLIE. Well then, uncle, at that rate every land on the face of the earth is an island, for the sea goes right round them all.

UNCLE. That is quite true, lad; but still we don't call the GREAT masses of land islands; we call them continents. An island means a water-land. Now when the water is so far from the middle of the land, as the sea is from the middle of a continent, water-land would not be a suitable name. If you can raise your eyes a minute from your new toy, and look to the south-east, you will *see* a continent. Yonder are the white cliffs of France lighted up by the setting sun. We don't often see them so clearly, for the straits are here five-and-twenty miles across. Look over the Channel to the south-west. Do you see any land there?

CHARLIE. No, uncle; nothing but water.

UNCLE. But France is there all the same. How is it, think you, that we cannot see it?

CHARLIE. Because it is behind the round surface of the sea, and so hidden from us.

UNCLE. Right; and there are no high hills in that part to show themselves to us over the top of the water. Now look here on the globe and see how narrow is this channel between France and England, which to us looks so broad. The Strait of Dover, which we can hardly see across, is but a narrow streak on this globe.

CHARLIE. Oh, then France is a continent?

UNCLE. No, Charlie; France is a country on the continent or mainland of Europe. All this pink patch is called the continent of Europe. This yellow patch further east, which is more than four times larger than Europe, is the continent of Asia; Asia and Europe together form, as you see, one unbroken mass of land. As nothing really parts them, they form but one continent. They were each named continents hundreds of years ago, when men knew little of the earth upon which they lived. South of Europe, see, lies another block of land—shaped like a pear—three times as large as Europe. That is Africa. All this forms what is called the Old World, because the people living on it did not know there were any other lands on the earth till about four hundred years ago. Then some bold seamen sailed westward three thousand miles across this great sea called the Atlantic Ocean, and came to another quarter of the earth. There they found what is called the New World—the two Americas. Its northern half, you see, is a vast continent, more than twice the size of Europe; its southern half is also nearly twice as large as the continent to which our island belongs.

CHAPTER VI.

THE POLES AND EQUATOR.

CHARLIE. Here is one more land, uncle. This is an island, at any rate.

UNCLE. Yes. Australia is an island, but so large that it is often called a continent. It lies, you see, south of Asia; and when it was first visited by white men, hardly a hundred years ago, it was called Southern or Austral Asia. Now we cut its name short—as we English love to cut short all words and speech. At first it was thought to be part of Asia—and learned men believe it to have been so once upon a time. Much of the sea to its north is very shallow—as I know to my cost, for I once very nearly lost my life there, through our boat striking against a coral reef.

CHARLIE. Oh, I've read about coral reefs; they are rocks built in warm seas by millions of millions of little creatures. Is the water warm between Asia and Australia?

UNCLE. Yes; the Indian Ocean, as the sea is there called, is shallow and warm. It lies, as you see, about the middle of the earth. But I am going too fast. I was so eager to give you some idea of the land and water on the face of the earth, that I have as yet told you nothing about heat and cold. You must know that the points where these two pivots hold the globe are what are called the poles. The upper one we call the North Pole, the lower the South.

CHARLIE. Poles? What an odd name! Surely you mean holes? For there must be holes under the pins.

UNCLE. Ah! when you heard the word poles, you began to think of masts, flagstaffs, clothes-props, hop-poles, and so on. That is not the meaning of the North and South Poles. Watch while I make the globe spin. There now, the middle points below each pivot round which this globe spins are at rest. The globe spins round a line joining the two points called poles. That line is at rest, so are the poles. If we were at the North or South Pole, we should find nothing there to mark the spot. You must have seen cart-wheels going round?

CHARLIE. To be sure, I have seen them going round their axles.

UNCLE. Just so the earth spins on its axis. We call the line through the middle of the earth the axis of the earth. If there were a hollow shaft straight through the middle of the earth from pole to pole, the axis would be along the very middle of that open shaft. In such an axis there could be nothing to see or handle. The axis then is that round which the earth spins.

CHARLIE. What is this yellow line drawn all round the globe midway between the two poles?

UNCLE. It is called the Equator. Can you guess why? You know a word like it.

CHARLIE. Equator, equator—equal. I see; it marks off two equal pieces, two halves.

UNCLE. Quite right, Charlie. Well, that line is marked *on the globe* as the poles are marked. On the earth there is no such line there, just as at the real poles there is no mark to show where they are. I've often crossed "the line," as we sailors call the equator, but I've never yet seen it, nor met any one else who has seen it.

CHARLIE. You mean that there is no such thing; that it's only a line drawn here to mark the middle all round halfway between the poles.

UNCLE. Just so, Charlie. In the same way you have lines in your copy-books, and you have to make some letters as much above the lines as you have to make others below the lines. When you are older you will be able to make your letters right without lines. We want the equator to measure from, as you will find out by-and-by, when you come to use maps. I must now tell you that at the poles eternal frost reigns. All about them is ice and snow. About the equator it is mostly very hot. As you travel from the poles towards the equator, you find earth, sea, and air becoming warmer. From the equator towards the poles you find them becoming colder.

CHAPTER VII.

THE SEA.

As soon as Uncle George left him, Charlie hurried home with his much-prized globe to find his sister. Bursting into the room where Mary sat mending clothes, he held up his new toy in great glee.

MARY. Well, Charlie, what have you there?

CHARLIE. Just look, Mary, what Uncle George has given me for my birthday; a model of the earth. Some day soon he is going to show me with it how the earth moves.

MARY. How kind of uncle! A globe is ever so much better than a map when one begins to study the surface of the earth. When I had only seen maps hanging on walls, I used to think the north was higher than the south, and that one had to go uphill to go north. When Jack went up the beanstalk, I thought he went north. I still keep the little atlas of maps which I used at school. It lies on a shelf up there, in a brown paper cover. Yes; that is it. If you will give it to me, I will show you some of the maps in it. There, see, is a map of the World, in two hemi spheres.

CHARLIE. The World on two plates would be a better name. Oh! I see now what it means. Look, this right-hand plate, marked "The Eastern Hemisphere," shows what uncle calls the Old World; that on the left, marked the "The Western Hemisphere," shows the New World. Look at this side of my new globe, then look at your right-hand map, and you will see they are nearly alike. Now, I turn my globe right round, and there you see much the same as on your left-hand map.

MARY. That is quite true, Charlie. And what have you been learning from your new toy?

CHARLIE. If you ask me a few questions, Mary, you will soon find out what little I know. When I have found out how little I do know, I shall be better able to learn more.

MARY. What is the meaning of all this pale green?

CHARLIE. That is the sea—which covers three-fourths of the earth's surface.

MARY. And what do you call this broad part of the sea near England?

CHARLIE. The Atlantic Ocean—parting Europe and Africa from the Americas.

MARY. And the still broader sheet between America and Asia.

CHARLIE. That is the Pacific Ocean. What does Pacific mean?

MARY. Peaceful, because the first ship that "ever burst into that silent sea" met with no storms all the way across it. What are these little dots all over it?

CHARLIE. Groups or clusters of islands.

MARY. And this water between Asia, Africa, and Australia?

CHARLIE. The Indian Ocean. Uncle George says he was nearly drowned there once on a coral reef.

MARY. Yes; poor uncle fell into a warm bath there. He would have fared worse had he been wrecked in the cold Arctic Ocean that washes the northern shore of America, Asia, and Europe, lying around the North Pole.

CHARLIE. Yes, or on the other side of the earth in the Antarctic Ocean, round the South Pole.

MARY. Do you know what the poles are made of?

CHARLIE. Nothing. It is only a name for the ends of the axis. The axis of the earth is also only a name for what the earth spins round. You thought to have a laugh at me then, Mary.

MARY. Well done, Charlie! There is something else on this globe which is not a real thing, but only a name.

CHARLIE. The equator, which sailors call the line, that ring marked all round the earth midway between the poles.

MARY. What do you call those parts of the sea which sever our country from Europe?

CHARLIE. The English Channel between us and France, the German Ocean or North Sea between us and the north-west of Europe. Those two sheets of water are joined together by the Strait of Dover. I wonder why it is called straight, Mary? it doesn't look straight.

MARY. Strait means narrow, when it is spelt without gh. Straits are narrows. Show me another strait on this map of Europe.

CHARLIE. Here is one, between Spain and Africa.

MARY. Right; the Strait of Gibraltar, a narrow passage from the Atlantic into the Mediterranean sea. Here is another leading into the Sea of Marmora, and yet another beyond that into the Black Sea. Now find another channel.

CHARLIE. Here is one between Ireland and Wales.

MARY. Right; St. George's Channel, a passage from the Irish Sea to the Atlantic. You see both straits and channels are passages from one part of the sea to another. Then, too, you should notice these land-locked arms of the sea called simply seas, as the Black Sea, the North Sea, the Mediterranean, the Baltic. You will find some large sheets of salt-water quite cut off from the great sea that flows all round the earth. Here is the largest of them, called the Caspian Sea; that is a great salt lake. Here is another, called the Sea of Aral; here is yet another called the Dead Sea, which is very, very salt, and three-quarters of a mile below the level of the GREAT SEA.

CHARLIE. Why, Cousin John lives at the lakes. His lakes must be fresh water, because he catches fresh-water fish in them.

MARY. Yes, our lakes are of fresh water, and so are most lakes, being formed by streams among hills. But we were talking about the arms of the sea when I went on to show you large sheets of salt water quite cut off from the sea. There are some smaller arms of the sea of which we have not yet spoken. Here is one between Italy and Greece, "the Gulf of Venice;" here another between Sweden and Russia, "the Gulf of Bothnia;" here another between Arabia and India, "the Persian Gulf."

CHARLIE. What a puzzling lot of names they do give to the sea, Mary!

MARY. Well, you see, as it goes in and out of the land we must have names for its different parts. Otherwise we should waste ever so much time in talking and writing. Thus, if we wished to speak of the Gulf of Venice, and if instead of using those words we had to say "the arm of the sea lying between Italy and Greece," it would soon become very tiresome. Traders and travellers could not well say where they had been, or what they had seen, without such names.

CHARLIE. Well, I see we must have the names. "In for a penny, in for a pound." Let me learn the rest of the names once for all, and I'll try to remember their meaning.

MARY. Well, I think I've told you nearly all the names of water; you will want to know but one more, and that is—

CHARLIE. I know! "Bay." I've seen the word so often while you've been taking me all about your straits, channels, and lakes, that I've made out for myself what a bay is. It's where the sea scoops out a hollow in the coast-line, as if it were making itself a quiet corner to lie in.

MARY. Yes; it has a wider opening than a gulf. The mouth of a river up which the tide comes, as it does up our river, is called an Estuary.

CHAPTER VIII.

THE LAND.

CHARLIE. Well, now that I've been all over the water, I suppose I must learn some more names for land. Let me see, I know some already. Here is the *continent* of Europe. England is a *country* on the *island* of Great Britain, and France is a country on the mainland. There! I have said that part of my lesson rather well.

MARY. You have now a very long name to learn. Look at Spain and Portugal, now at Italy, now at Greece, now at Norway and Sweden, now at Arabia, now at India. What do you notice?

CHARLIE. Each has sea on every side but one.

MARY. Well, when you see land like that, what does it seem almost? If a canal were cut through that one side, what would it then become?

CHARLIE. An island.

MARY. Quite so; such land is called a peninsula.

CHARLIE. I have just thought of an easy way of remembering some of these things. I will call my body a continent; then my head is a peninsula. That reminds me to ask what you call the neck of land which joins a peninsula to the mainland.

MARY. Sometimes what you just now called it, a neck of land, sometimes an isthmus. Here is one that I should dearly like to see cut through, the Isthmus of Panamá. If there were a canal there, see what a saving it would be to many voyagers.

Charlie. Isthmus! what a hissing word. Well then, my neck is an isthmus forming two bays, one on each side between my head and my shoulders. I hope you will not be for cutting *that* isthmus in two. When my arm hangs down loose there is a gulf between it and my side; when I let my hand nearly touch my leg, it makes a strait. As I stand near you, there is a channel between us!

Mary. What a funny boy you are, Charlie! And now, if you choose, you may leave your globe alone and look at these maps of mine. There is one advantage in a map, that you can lay it down flat and so study it better than you can a globe; only remember always that a flat map can never give an exact plan of any large part of our round earth. If you press a bit of an indiarubber ball flat with a big weight, it will not be as it was before; it will stretch somewhere. Some parts of a flat map are always wrong. First of all I must tell you that the top of a map is always the north. That came about no doubt because maps were first made in countries north of the Equator. Now of course you will be able to tell me what the other sides of the map are.

Charlie. Why yes, I know from having been so often out at sea, that when I stand facing the north, the east is on my right, the west on my left, and the south behind me. Thus, if the top of the map is the north, its right hand side must be the cast, the left hand the west, and the bottom the south.

Mary. Then by looking at this map you can say at once on which side of Europe we English live.

CHARLIE. On the west.

MARY. And the Russians?

CHARLIE. On the east. But, Mary, how is it you know so much about maps?

MARY. Because I am so fond of listening to Uncle George. I could not follow him in his tales of foreign travel if I were not fairly well up in maps. When I was a girl at school I used to hate geography, and no wonder! They used to make us learn and say off long strings of names of countries, mountains, rivers, towns, and so on. Then, too, we were taught to sing-song like so many parrots, in a class all together, many times over, "An ocean is the largest division of water," "a lake is a piece of water entirely surrounded by land," "the Equator is an imaginary line passing round the middle of the earth," and much else which was no doubt quite true, but of which we did not know, or care to know, the meaning.

CHARLIE. Ha! ha! fancy a *piece* of water! How you must have hated it! What a lucky dog I am to have Uncle George to teach me. He has been all over the world, and tells me things which he has *seen*.

CHAPTER IX.

RIVERS.

CHARLIE. And now, Mary, as you have found out the little I have learnt by questioning me, let me try to learn some more by questioning you. Where we live, you know, the land is up and down. In some parts the country is flat; then again, in others, one has to keep going up hill and down hill. Now my globe is quite smooth, and your maps are quite flat. Thus they cannot show the ups and downs.

MARY. Quite true, Charlie. We will now turn to the map of England, and see how the hills *are* shown. That is the county of Kent; this the coast where we live. Our little bit of a town is not marked on this map, but that dot stands for Dover, and that for Folkestone. North of these, you know, lie "the Downs."

CHARLIE. The Ups, they ought to be called, for they are high enough.

MARY. "Downs" is an old word, meaning hills, I've heard father say. If you look at the map, you will see some marks to show where the Downs are.

CHARLIE. Oh I see, something like little hairy caterpillars?

MARY. Yes, funny boy; that is how hills and mountains are marked on maps. You will find a few on your little globe, if you look.

CHARLIE. So there are—look what black fellows these are in the South of Asia.

MARY. The higher the mountains, the blacker the marks are made.

CHARLIE. And what are these little black lines, like thin worms wriggling about?

MARY. Rivers, nasty boy, with your worms and caterpillars! At their sources the lines are very thin, to show how small the rivers are where they rise. Those which you see joining larger rivers on both sides are smaller rivers, called tributaries, because they pay tribute to larger streams. You know what tribute means, because you've read about the Jews paying tribute to Cæsar.

CHARLIE. Taxes, I believe.

MARY. Quite right. You should also learn to give each side of a river its right name. Towns are often built on the banks of rivers, some on one side, some on the other. Here for instance, are two, Liverpool and Birkenhead, one on this, the other on that bank of the river Mersey. Well this town, Liverpool, is on the right bank of the river; that town, Birkenhead, is on its left bank.

CHARLIE. But you can make either side right or left, by simply turning round. Don't you remember my joke of making north south, by turning round from east to west?

MARY. I will show you how to know which is the right and which the left bank of a stream. It is so easy to make mistakes, that it is worth while making ourselves quite sure. You and I often go northward, over the Downs behind our cottage, till we come to where the ground slopes downward to the north. At the bottom we reach the brook, gather watercresses, and watch the trout rising to snap flies as they float down stream.

CHARLIE. Yes, and sometimes we go on walking beside the stream, till it joins the little river just above the town. Why, Mary, that brook must be a tributary of the river?

MARY. To be sure, falling into the river on its right bank. When we walk down the stream to its meeting with the river, we walk along the right bank of the brook. Now do you begin to see?

CHARLIE. I think I do. When we walk along the way the water flows, with the stream on our left, we are on its right bank. Yes, I see.

MARY. And when a vessel is leaving our little port, it passes the town on the right bank, and the east cliff on the left bank of the river. When we are gathering watercresses, if the brook be low, we sometimes cross over and sit down. We are then sitting on its left bank. As we sit there watching the water, we see it running away from our right hands towards our left hands.

CHARLIE. Well, if one can be so easily puzzled between right and left, it were surely better to say north and south, east or west bank.

MARY. Why, you dear little goose! Don't you remember how the brook winds in and out, and in places even doubles back? Thus its right bank is here south, there east, here north, and there west. Look at this map of England. Here is the basin of the river Severn.

CHARLIE. What do you mean by basin?

MARY. All the country drained by one river, and its feeders, as we sometimes call tributaries. The Severn rises on the north-eastern slope of this mountain range, marked Plinlimmon. For many miles the Severn's course is towards the north-east; then bending round it flows southwards for many miles. Towards its mouth it flows to the south-west. There are two towns, Welshpool and Gloucester, both on its left bank. Yet Welshpool lies to the west of the river, Gloucester to the east. Here is another river, called the Trent. For some miles from its source it flows south, then turns east, then north. Hence towns standing on its right bank near its source have the river to the east; near its mouth, to the west. The course of each of those rivers is like a carter's whip: their sources are the lash, their mouths the handles.

CHARLIE. I see what you mean. I shall remember whenever I see a river on a map to look which way it flows. Then I shall fancy myself floating down it in a boat. If I look the way the water flows, I shall have the right bank on my right hand, the left bank on my left hand?

MARY. Yes; and if, as you stand or sit on a river bank, the water flows from your left side to your right, you are on its right bank. Before you take your eyes from the basins of the Trent and Severn, I should like you to notice what parts them. Were there not high ground called the water-parting between the river basins, their waters might run together and flood the land.

CHARLIE. Then a water-parting is like the ridge on the roof of our cottage, and sheds the rain two ways.

MARY. Well said, Charlie! A roof is like a water-shed, only far steeper, and its ridge is a water-parting.

CHARLIE. And the eaves-troughs are river-beds.

MARY. Not quite; for they have but *one* water-shed, whereas rivers have always *two*, one on each bank.

CHAPTER X.

MAP DRAWING.

CHARLIE. What are these lines drawn from town to town all over the map?

MARY. They are roads. In a small map there is no room for all the roads, only for the main roads. On this map every inch stands for fifty miles. Thus there is no room for villages or very small towns. Father has a map of the country for twenty miles round us, on which every inch stands for a mile. That map shows every lane, and even our windmill, station, and lighthouse. Here is a map of London where every inch stands for a quarter of a mile.

CHARLIE. Then if a street is an inch long on this map, it is really a quarter of a mile long.

MARY. Yes, whenever you are using a map you should look at the scale in the corner. The scale shows how many miles go to every inch or other length set down. If you don't look at the scale you will be thinking small countries as large as great ones, and be quite astray about sizes and distances. It would be good practice if you would now try to draw a map or plan of our cottage and garden, and of some few yards round them. That will teach you what to put in a map and what not to put, and will help you to see how things are marked.

Charlie. But how am I to set about drawing a map of our cottage, Mary?

Mary. You would draw lines where the walls touch the ground. Take your slate, and I'll show you how. One thing makes our cottage far easier to plan than most houses:—it faces due south; now, as the top of the map is always the north, every line of our cottage walls will lie like the edge of the slate. Let us sit beside each other and set to work. We shall find it easier to sketch our plan if we sit facing the north. Then every line drawn on the slate will lie just as the wall for which it stands. Here, for instance, we put the front or south wall of the cottage; there, on your right, its east wall facing the windmill; here, on your left, its west wall facing the coastguard station; there the back yard facing due north; now for the garden walls; now the walks; now the footpath to the windmill; now the road from the town to the coastguard station running north of our cottage; now the station, now the beach. There! that will do for a first attempt. As long as the slate lies thus, if you point to anything that we have set down on the slate you will see the line on the slate pointing the same way. If I turn the slate any other way, the lines do not tally at all.

Charlie. Well, now I should like to put in much more—the town, the river, the brook, and the lighthouse.

Mary. Then we shall have to make all very much smaller, or else we shall want a slate as large as this room. Your slate is only ten inches one way and six the other. Now it is half a mile to the town, and as far to the watercress brook. Suppose, then, we allow four inches for every mile. Your pencil is just four inches long; so we can easily mark off that.

Now set this little square in the middle of the slate for the cottage, then measure off two inches to the right for the town, because it lies due east of us. Put a cross for the church and lines for the streets. Now trace the river as far as you know it; now the brook; now the shore round Chalkness. Yes, that is right; it is just like a pear. Put the lighthouse at the south-eastern point of that little peninsula; now the windmill at the pear-stalk.

CHARLIE. Pear-stalk indeed! I'm quite ashamed of you, little girl! Isthmus, if you please, isthmus!

MARY. Well done, Charlie. "An isthmus is a neck of land joining two larger—"

CHARLIE. Do stop that, Mary; it drives me wild to think of your school drudgery.

CHAPTER XI.

THE GLOBE.

Some days after this talk with his sister, Charlie came down from his bedroom one evening, bearing in his arms an old tea-tray, covered with a sheet of newspaper. His look was full of importance as he laid his burden carefully down on the table before Mary, where she sat at her mending.

Mary. Well, Charlie, what have you there?

Charlie. You'll never guess, so I'll take off the paper. There! take a good look, and tell me what it all means.

Mary. Oh, I see. You were not content with our sketch on the slate of our cottage, town, and surroundings, because it did not show anything above the ground level; so you've made a model of them all. It was for this, then, that you wanted the lead-paper from the tea-chest to make something like the sea in our little cove, and the river water. Why, you have a real bit of chalk here for the cliff, and bits of moss for the grassy down. Ah, here comes Uncle George. Look, uncle, what a pretty model Charlie has been making of our cottage, town, lighthouse, brook, and cliffs!

Uncle. Well done, lad! upon my word it does you great credit.

CHARLIE. I'm glad you like it, uncle. Will you now tell me what you promised to explain when you gave me the globe?

UNCLE. To be sure I will, now that I see you are in downright earnest, and take so much pains to understand things around you. Fetch out your globe and set it on the table. There we have two models: one of the mighty earth we live on; the other of our own little corner of it. I should like you now to come out with me to the back yard a minute. You see those seven large stars in the shape of a plough?

MARY. Yes, you mean Charles' Wain; or, as some call them, the Great Bear.

UNCLE. The same. Now begin to count from the shaft round the share till you reach the sixth star. Fancy a line drawn from that star to the seventh, and carried straight on till you get a little further from the seventh star than that is from the first. There you see a bright star all by itself. That is the Polar Star. You will see that star on any bright night all the year through in the same place. All other stars seem to wheel round it—from east to west. Follow me indoors, and you will see why I took you out to find and notice that star. The axis of the earth—that round which the earth spins—points nearly straight to that star. I now place your globe on the west side of the table. But mark how I place it. If you wish a map to tally with the direction of places, you lay its top northwards. A globe should be so placed that the north of its axis points straight to the polar star. Now the walls of this room are built facing what we sailors call the cardinal points, that is the points on which the others hinge—north, south, east, and west. Thus here I do not need to *see* the polar star in order to set the globe on the table aright. If its brass ring and its pivots are set as they ought to be, the globe is now standing on this table as the earth itself is in space, Thus the north of its axis, like the north pole itself, is pointing nearly to the polar star, just as the north pole of the earth does. Now you see at once there are two ways of making the globe spin, but only one of those can be right. Which is it, Charlie?

CHARLIE. You told me that the sun seemed to be always journeying from east to west, because the earth is always rolling from west to east. So you must make the globe spin from west to east—from left to right.

UNCLE. Quite right. I must touch its *right* side and push it *from* me. It moves the opposite way to that in which the hands of a clock move. I now set the lamp in the middle of the table. It stands for the sun. You will notice that I take great pains to have the flame just as high as the middle of the globe. Now stand where you can see all the lighted surface, and say what you see.

CHARLIE. I could not see more than this half of the globe, for the other half has no light on it.

UNCLE. Of course not; while one side of the earth is lighted by the sun, the other side is of course in the shade, as the earth is solid, and the sun's light cannot go round the edge. The globe is now standing as the earth was towards the end of March—near Mary's birthday, remember—when you first began to notice sunshine and shadow. Watch while I make it slowly spin. You now see the two Americas facing you in full sunlight.

CHARLIE. Yes; and now they are going into the shade. Now the Pacific Ocean, with its countless thousands of islands, is coming into the light of the lamp. Towards the south I see New Zealand. Here come Australia at the bottom, the East Indies in the middle, at the top Japan; now China, now India, now Arabia. Here come Africa and Europe. Ah! here at last comes England. Now England is right in the middle.

UNCLE. True. That means that it is now mid-day, or noon, in England. I now take this slip of gummed paper to stand for a ship's masts, and stick it on the Strait of Dover. Now look quite close at the shadow of the paper, while I make England once more come into the light. Mark how long a shadow the paper throws when it is just coming into the light. That, remember, is just how you saw your cottage at sunrise. The shadow is now growing shorter. Now it is at its shortest at noon. I now take another slip of gummed paper, and stick it on the Gulf of Guinea, just on the equator, due south of England. There, you see, it throws no shadow at all. I now place another slip on the sea still farther south—as far from the equator as England is; and as near to the South Pole as we are to the North Pole. The shadow there is of the same length as that in our own land. And now I let the globe with the three papers roll on eastwards. Look again at the three shadows. All three are now long—as our shadows are always long towards sunset. And now, Charlie, let us go back to last March, when you lay ill in bed, and watched the sunshine lighting up the west wall of your bed-room in the morning, then gliding down to the floor and stealing along it all day, till at tea-time it stole up the east wall and then went out. With this gummed paper I make a wee three-sided box. On one side of it I cut out a square hole like the window of your bed-room, and set it on the south-east corner of Great Britain. I now turn the globe once more round. If you peep through the hole, taking care not to let your head come between it and the lamp, you will see a streak of light on the west side of the box.

CHARLIE. Yes; there it is. Look, Mary, that is just as I used to see it at seven o'clock in the morning.

UNCLE. Well, now, as I let it roll very slowly towards noon, watch the lamplight slowly gliding down the wall to the floor, now along the floor. Now, see, it is noon, and the lamplight falls through the hole on the floor below. Just before the box rolls out of the lamplight, you will see a line of light on the east side.

CHARLIE. Oh, thank you, uncle. I understand it now. But you have not yet shown me how it is that the sun does not rise now, in summer time, as it did at the end of March.

UNCLE. All in good time, my boy! "More haste, worse speed." We old folks don't like being hurried. I want you to notice some other things before we leave the earth as it is in March. You said you could only see half the globe at a time now. Is it always the same half?

CHARLIE. Not when you make the globe spin. A fresh slice on the west comes into the light every moment, and a slice on the east goes into the dark.

UNCLE. Exactly. Then what, think you, does that show about the earth?

CHARLIE. Let me see; the earth keeps turning eastwards into the light, then into the dark, then again into the light, then again into the dark. Oh, I see! The sun is always rising to places on one side, and setting to places on exactly the other side of the earth.

UNCLE. Well done, Charlie; you have it now. Here, for instance, are some islands in the Pacific Ocean—New Zealand and the Fiji Isles. Well, now you may notice that, as England is going into the dark, these islands are coming into the light. What does that show?

CHARLIE. Why, that when we see the sun setting, New Zealand and Fiji see him rising.

UNCLE. Quite right. When it is noon in England, what must it be in the Fiji Islands?

CHARLIE. Why, midnight. I am glad you made me notice that. *Now*, whenever I'm dull, I shall amuse myself thinking what folk are doing in other parts of the world. When I am lying awake in the dark at night, as I sometimes do, I shall think of the great ocean where ships are sailing to and fro in the sunshine, and of countries where little boys are getting out of bed, washing and dressing themselves, and saying their prayers.

UNCLE. Would that every little motherless boy had a good, kind elder sister as you have, to see to all that! I'm glad to see that your thoughts go out to other folks and other lands. Of some of them I shall love to tell you from time to time what I have seen.

CHAPTER XII.

THE EARTH'S DAILY MOTION.

AND now, Charlie, let us suppose that there's another little fellow like you living in New Zealand. We will call him Jim. Suppose that when you were lying ill in bed here last March, Jim too had been lying ill in bed in New Zealand. What friend who came to see you every day went to see Jim also soon after quitting your room?

CHARLIE. How droll you are, uncle! You mean the sun.

UNCLE. Yes, the sun, who peeped in daily at your south window, and whose visits you marked on wall and floor. By the way, it was rather rude of you to mark how long your visitor stayed! Now which of Jim's windows did the sun peer through? You must look at the globe and think before you answer me that question. I have turned New Zealand round to noon.

CHARLIE. May I have another paper box, uncle, and lay it on New Zealand for Jim's house? Thank you. Oh, dear me! that will not do! If I put it as it was on Kent, the light won't get into the window-hole at all. So I'll turn it round, and let it face the other way. There, now the light falls on Jim's floor as it fell on mine. I have it now. Jim's window faces north. How very strange that seems, when *we* always see the sun in the south at noon.

UNCLE. It only shows, Charlie, that you have not yet quite mastered all that I have told and shown you. Day and night are caused by the earth's spinning on its axis, and showing to the sun only one half of its face at a time, and that half never quite the same for two moments together. You, living in the northern half of the globe, see the sun at noon in the south side of the sky. Jim, living in the southern half of the earth, sees it at midday in the north side of the sky. How is that?

CHARLIE. I really can't see, uncle.

UNCLE. Because the sun is always somewhere over the equator. I say somewhere, mind, because it is only twice a year exactly over the equator; at the end of March, on Mary's birthday, as you see the globe now; and again towards the end of September, your father's birthday, to which we shall come by-and-by. You now see why I was so careful to have the lamp flame just level with the middle of the globe.

You have now had time to see how various places on the earth's surface see the sun morning, noon, and evening at the beginning of spring. At that time of the year the sun rises due east at six, and sets due west at six. Thus we have then twelve hours day and twelve hours night all over the earth, from the North Pole to the South. I take no account of twilight,—that is, the light shortly before sunrise and a little after sunset. Near the equator there is little or no twilight. When the sun sets there, "at one stride comes the dark." If we were now at the equator instead of on the northern half of the earth, how do you think I should have to set this globe to show how the earth spins?

CHARLIE. You would have to place it with the north pole pointing to the polar star.

UNCLE. True, but at the equator the polar star is just on the sky-line, and cannot be seen. We should have to set the axis of the globe quite level like the top of the water, and make it spin like a grindstone.

CHARLIE. Of course; I see now. And at either pole you would have to set the axis quite upright.

MARY. Forgive me, uncle, but it is high time Charlie went to bed. If he goes on talking to you much longer, he will not sleep a wink to-night. Or if he does, he will be talking in his sleep about all the strange things he has been learning from you.

UNCLE. You are quite right, Mary. He has had quite as much as is good for him. When I was a boy, my mother warned me always to rise from table hungry. By that she meant not to stint me of food, but that I ought never to eat so much at once that I could eat no more. So now you quit my table hungering for more teaching about this wondrous earth and its movements.

CHAPTER XIII.

THE EARTH'S YEARLY MOTION.

NEXT evening Uncle George came to finish his talk with Charlie. Finding him at the table, with the globe and lamp all ready, he said,—

"Well now, Charlie, I must try to make you see why the fickle sunshine has left your wafers and brass nails this fine summer weather. You must know that the sun now is just where it was last March. It is the earth which has shifted its place. Every minute now while I am speaking the earth is whirling through space, speeding on a never-ending journey round the sun, and ever spinning as she speeds. You may well look startled. We will talk no more of it just now. You shall think it over by yourself. Yesterday I showed you what comes of the earth's spinning once in every twenty-four hours round her axis. I will now show you what comes of the earth's travelling round the sun. I set the globe yesterday on the west side of the table. I told you it stood to the lamp then as the earth does to the sun towards the end of March. Now as there are two ways of making the globe spin, so also there are two ways of shifting this globe round a table. I might take it round by the north, like the hands of a watch. That would be wrong. The earth moves eastward, not westward.

I now set the globe a-spinning. As it is spinning, I move it slowly towards the south side of the table. Here I will leave it standing, while I show how the earth will be to the sun three months or about ninety-two days after our last view of it. Notice that I keep the north pole pointing in the same direction as before. The globe is now as the earth is at midsummer. Before it was at spring. Do you see any difference?"

CHARLIE. Oh, yes! Now the north pole and the ring round it are all the while in the light as the globe spins, and the south pole is quite in the dark. Yes, and England stays in the light ever so much longer than she stays in the dark.

UNCLE. True. You had noticed that we are now having long days and short nights. Now you see the reason. When I now put slips of gummed paper on as I did before, you notice that the noontide shadow on England is shorter than it was in spring time. The paper at the equator now casts a shadow there. If I want it to throw no shadow at midsummer, I must put the paper in North-West Africa in the great desert called Sahara, a vast treeless, waterless sea of sand. If you were now in the great desert you would find the sun exactly overhead at noon. An upright pole there would throw no shadow at mid-day.

CHARLIE. But does the sun at midsummer never set at the north pole nor rise at the south?

UNCLE. No. From your sister's to your father's birthday, from nearly the end of March to nearly the end of September, the sun never sets to the north pole nor rises to the south pole. The one has six months day, the other six months night.

CHARLIE. Well, I think that's a great shame!

UNCLE. Don't be in a hurry, Charlie. It is all fair. From September to March the north pole has six months night, the south pole six months day.

CHARLIE. Oh, that's all right. I should have thought it a shame otherwise. But how dreadfully hot the North Pole must become after so many months sunshine.

UNCLE. Not so, Charlie. Have you never toasted yourself a bit of bread, or dried a wet coat at the fire? If you were to hold your bread or your coat to the fire, as the top of this globe lies to the lamp, you would not find your bread toast, nor your clothes dry, very quickly. About midsummer, if you were at the North Pole, you would see the sun going all round a little above the sky-line, and keeping nearly the same even height for weeks together.

CHARLIE. Oh, then, that's why twelve hours sunshine at the equator is so much hotter than seventeen hours here? We here are like bread held slantwise to the fire, and not right up in front of it.

MARY. Yes, and haven't you noticed how hot it is in summer weather on that bank which slopes south behind the cottage? The heat strikes it straight instead of slanting. On very hot days Charlie and I often go over the down and sit where it slopes to the north, because there it is so very much cooler. Of course, I see now, that is because the heat glances off. That too, must be the reason why things in our garden are always so much forwarder than in Mr. Smith's. His garden slopes northwards, ours southwards.

CHAPTER XIV

THE FOUR SEASONS.

UNCLE. We will now let our globe travel round to the east side of the table. Can you tell me what season we have now reached?

CHARLIE. Father's birthday, towards the end of September; for I see both north and south poles now, and every place seems as long in the light as in the shade.

UNCLE. Well then, we need not stop here. But I should just like to ask you what season you think this is in New Zealand?

MARY. Spring, uncle; because it is our autumn, and their seasons are just the reverse of ours.

UNCLE. That is quite true, Mary, but hardly a good reason. It is spring on the southern half of the earth because the days are there growing longer and warmer, and the heat is being stored up; autumn with us northerners, because the days here are then growing shorter and colder, and the heat is being lost. As the nights become shorter, there is less time for the sun's day heat to escape, and be lost. After the winter's rest the sap begins to stir in the buds.

I now move the globe on to the north of the table. As it stands now, it is like the earth in our midwinter. The north pole and its arctic circle are now in the shade, in the midst of their six months night. The south pole is enjoying its six months' day. If you were sailing in midwinter off Queensland, Madagascar, or anywhere else as far south of the equator, you would see the masts casting no shadows there at noon. Let us stick our gummed paper now on England, and mark what a long shadow it casts at noon. Mark, too, how short a time England now stays in the light, and how long it has to stay in the shade. You have not yet forgotten the short days and level sunbeams of last December.

You have now been shown how the earth, by ever spinning, carries us and all that dwell upon her surface into and out of the sun's light once every twenty-four hours. Half her face has day and half has night, simply because the earth is a solid rolling ball. If the earth did not travel round the sun, but only turned on its own axis, we should still have day and night. But you found out for yourself that during six months the days become longer, the nights shorter, but during the next six months the days become shorter, the nights longer. By watching this globe as it spins slantwise on different sides of the lamp you have seen the same changing effects of light and shade on its surface that you had noticed in your own bedroom during the past year. Thus you have learnt the causes of the four seasons, which all lands have except those near the equator.

I must now point out to you something else, which, as you are always in bed betimes, you have been unable to mark. At midnight we see one set of stars in winter, another in spring, another in summer, and a fourth in autumn. The stars rise four minutes earlier every night, that is, about half an hour in a week, and six hours in three months; mark what we learn from that. Look at the four walls of this room. In the south wall is a window, in the east a cupboard, in the north a fireplace, in the west a door. When our globe was standing near the west wall it was to the lamp as the earth is to the sun in spring. The lamp in the middle of the table stood for the sun. Which wall was then over against England at noon?

CHARLIE. The east wall.

UNCLE. Right. As England was coming into lamplight it faced the window in the south wall. At noon it faced the cupboard in the east wall. At evening it faced the fireplace in the north wall. At midnight?

CHARLIE. It faced the door in the west wall.

UNCLE. Right. Now suppose these walls, ceiling, and floor, to be studded with stars. You see at once, that in spring-time at midnight we see the stars about the door, because it is only at night we see the stars. Thus we could see only those away from the sun. At summer-time the earth is to the sun as the globe was to the lamp on the south side of the table. What stars were then to be seen at midnight?

CHARLIE. Those about the window.

UNCLE. And in autumn, when the globe stood on the east side of the table?

CHARLIE. Those about the cupboard; and at winter those about the fireplace.

UNCLE. Thus, the dark side of the globe faced the west wall in spring, the south wall in summer, the east wall in autumn, and the north wall in winter. The dark side of the globe is the night side of earth. Thus the earth travelling round the sun faces one set of stars in spring, another set in summer, a third set in autumn, and a fourth in winter. The spring stars are always the same, so are the summer stars, the autumn, and the winter.

CHARLIE. How wonderful! I begin to see that all this is because it takes the earth just a year to go round the sun.

UNCLE. Then, Charlie, you now know what for ages the wise, good, and great vainly yearned to know. Think it all well over, mark for yourself the rising and setting of the stars, and let your heart go forth to the Eternal who dwelleth in the heavens, and yet is not far off from every one of us. The stars are His, He made them.

CHAPTER XV.

THE FIVE ZONES.

SOME days later Mr. Seaforth noticed Charlie busily cutting out pieces of paper of various sizes, some large, some small. A map of the world lay open on the table before him. "Well, Charlie, my boy," said his father, "what are you about?"

CHARLIE. Why, Uncle George has been telling me that there is nearly three times as much sea as there is land on the surface of the earth. As it is raining, I thought I should like to measure it out for myself.

MR. S. And how are you doing that, Charlie?

CHARLIE. Why, Mary lent me some thin paper which she uses for cutting out patterns of clothes. When I lay this paper on the map I can see the different seas and lands quite plainly through the paper. Then I trace their coast-lines with the point of a lead pencil, and, when I have done that, I lay the paper flat and cut along the pencil marks with Mary's scissors.

MR. S. You could hardly do anything more likely to make you remember the size and shape of the lands on the face of the earth. Where did you begin?

CHARLIE. With Africa, because the edge is not so jagged as the outline of most countries.

MR. S. True; the coast-line of Africa is very even, and has very few openings. Africa has far less coast-line for its size than any land. It has what is called an iron-bound coast; hated by sailors, because they can neither land, nor yet find shelter.

CHARLIE. The next easiest lands I found to be South America and Australia. After these I tackled North America. Europe and Asia I left to the last, because all along their south coast lands keep jutting out into the sea, forming what Uncle George calls peninsulas, parted by deep gulfs. These made it very difficult to cut out. However, I have at last done all, and have only the islands now left to do.

MR. S. Well, Charlie, if it goes on raining till you have cut out all the islands, I fear we shall have a flood. All the islands on the earth make up about as much as two-thirds of Australia. Add a piece of paper of that size and we may consider that settled. What next?

CHARLIE. I mean now to take all these pieces of paper which I have cut out, and to fit them neatly together upon this large sheet which I have here. It is just the size of that great sea between Asia and America—the Pacific Ocean. There, see, I have now laid them all down, and still have plenty of room to spare.

MR. S. Very true. So now you see for yourself that every bit of land on the earth might be laid in the Pacific Ocean without filling up that mighty water; and when that was done we should still have left over and above the Atlantic Ocean, the two Polar Seas, and the Indian Ocean! And now, Charlie, as you seem fond of this sort of thing, I'll tell you something else which you can do, if you like, when next we have a rainy day. If you look at this globe you will see on each side of the equator two rings marking off five belts, two narrow, the other three broad. The two narrow belts called frigid zones, or frozen belts, lie one round each pole. The other three belts are each about twice as broad. Of these, one having the equator in the middle, is called the "torrid zone" or the sultry belt; the others, one on each side of that, are called the temperate zones; of these, one lies on the north, the other on the south of the sultry belt. You need not trouble yourself about the cold belts, because they are mostly too cold for men to live in, and are nearly all the year round wrapped in ice and snow. But you might do well to cut out three strips of paper to fit roughly round the broad belts, and then to trace the lands on them with your pencil. If you were then to lay these strips out lengthwise on the table, you would be able to see at a glance all the countries that lie in the same latitude. But I am forgetting, Charlie, you don't yet know what that long word latitude means. It means distance from the equator towards either the north or the south pole. Thus, take the north temperate zone, which lies between this ring on the globe marked "Arctic circle," and this other ring marked "Tropic of Cancer." Within this belt lies our own island, all Europe, most of Asia, and all North America. Now take the tropics,—one half on the north, the other half on the south of the equator; there you find the greater part of Africa and of South America, the East and West Indies, the southern points of Asia, and the northern third of Australia. Now take the south temperate zone. There you find very little land; only the very south of Africa, and of South America, New Zealand, and two-thirds of Australia.

Charlie. What does tropic mean?

Uncle. Turning point. At midsummer the northern ring marked Tropic of Cancer has the sun overhead at noon; at midwinter the southern ring marked Tropic of Capricorn lies under the sun. At these lines the sun seems to turn.

CHAPTER XVI.

THE EARTH'S CRUST.

UNCLE. I should like you now to tell me anything that seems strange to you as you look over the land and water on the face of the globe.

CHARLIE. It seems strange that there should be so much more land at the north than at the south! Strange that so many lands grow to points towards the south. If this were a puzzle-picture, I should say that the west coast of Africa was made to fit on the north-easterly bulge of South America.

MR. S. I'm glad to see that you use your eyes. If one could push Africa some three thousand miles further west, it would fit neatly into the Gulf of Mexico. I will now tell you other things which you will like to know, but would not be likely to notice for yourself, because our maps are flat, not raised like your pretty model. You notice that Europe and Asia stretch further from east to west than from north to south. You will find that their mountains do the same. Here stretch the Alps, Carpathians, and Caucasus, here the snowy giants which tower north of India and screen it from the cold north winds of Asia. Behind this mighty screen a vast-table land, three miles and a half high, slopes northward. The southern slopes of all the Old-World ranges are steeper than the northern slopes. The thin end of the wedge points northwards. Now in the New World, the main chain of mountains, like the land, stretches from north to south, and in this mighty chain, some ten thousand miles long, the western slopes are far steeper than the eastern. As one sails off the west coast of South America one sees snowy peaks day after day stretching for hundreds of miles from three to four miles in height. Of course you know why one can see these peaks towering up when one is far away from land?

CHARLIE. Because they are high enough to be seen above the round surface of the sea.

MR. S. And in the darkest nights, too, some of them can be seen, because they send out flames. Down their sides flow molten rocks welling up from the bowels of the earth.

CHARLIE. What a grand sight that must be!

MR. S. Yes, an active volcano is indeed a grand sight, but yet it is well for us that we have no such dangerous neighbours here. When you are older you will read of the havoc worked by a volcano called Vesuvius, which once destroyed two whole cities before the people could escape.

CHARLIE. What, were they all burnt up?

MR. S. No, not burnt, save perhaps some few by streams of red-hot lava, but stifled by falling showers of ashes, which smothered the poor men, women and children, as they sat in their homes or walked the streets, or fled from their doomed cities.

CHARLIE. What an awful death!

MR. S. Then too, countries where there are volcanoes are often shaken by a sudden upheaval of the earth. In olden times men thought some huge giant lay under the ground, who, by writhing in his agony, or turning over in his sleep, caused earthquakes. In the centre of the East Indian and Japanese Islands earthquakes happen so often that houses are seldom built of stones and tiles, lest they should topple on men's heads and bury them in the ruins.

CHARLIE. Then what causes earthquakes?

MR. S. Heat pent under the crust of the earth; while it is spending its strength, by pouring out molten rocks from the tops of mountains, it does not shake the earth. When these rents are choked the pent-up gases rend the earth's crust to find a way of escape. Volcanoes are mostly near the sea. Sometimes a fire mountain has been thrown up in one night, and formed an island in the middle of the sea. It was once thought that the whole of the inside of the earth is a mass of fire, only thirty miles below where we stand.

CHARLIE. But how could they think that? Have they ever dug down so deep?

MR. S. No mine has ever been sunk even three quarters of a mile. But the deeper we dig, the warmer it is found down below.

CHARLIE. But why not dig deeper?

MR. S. Men cannot stand the heat; and if they could, at a few miles' depth they would find the weight of the air more than they could bear.

CHARLIE. The *weight* of the air? why, we always say "light as air."

MR. S. We do; but it has weight. It rises above us all round the earth for fifty miles in height. If its weight were suddenly taken from us the blood would spout from our veins, and we should at once die. In going up high mountains men often bleed at ears and nose.

CHAPTER XVII.

LONGITUDE AND LATITUDE.

UNCLE GEORGE coming in next day found Charlie poring over his globe and writing down names on his slate.

UNCLE. What are you doing now?

CHARLIE. The other day you showed me how the earth's spinning caused day and night. You made me see that there were always some places where the sun was rising, others where it was setting; some where it was noon, others where it was night. Now I've been putting down places that have their noon about the same time. I find there are some rings drawn round the globe which meet together at each pole. Now places on these rings come under the sun all at the same time. So now I know that when it is midday at any place it is midday at the same time at all places due north and due south of that place. When it is noon here in Kent it is noon all down the west of France, the east of Spain, the west of Africa, and the east of the Atlantic Ocean.

UNCLE. I am right glad to find you thus able to amuse yourself. You are quite right. All places that have the same longitude, whether north or south, have noon at the same time. That is one of our many ways of finding out our whereabouts when we are at sea.

CHARLIE. Well then, uncle, I suppose I may call these rings "noon-rings," as they pass through places all having noon at the same time.

UNCLE. A very good name. But they show something else besides midday, do they not?

CHARLIE. Yes, of course, midnight also; but still, to say "midday and midnight rings" would be long and tiresome.

UNCLE. True; no need for four words where two will do. So let them be "noon rings," as long as you're a youngster. When you're older you will have to use a longer name, "meridians of longitude." Longitude means length; on the globe it means position east or west of a given place, as London, Paris, or elsewhere. Meridians mean lines marking midday or noon.

CHARLIE. Then, too, I've hit upon a name for these rings that run round the globe like the equator. I see that every place through which one of these passes has days and nights of the same length at the same time of the year.

UNCLE. But how did you find that out?

CHARLIE. By watching them carefully as the globe was spinning slowly before the lamp. Every place on one of these rings in its turn comes into the light and then goes into the dark. Each stays the same time in the dark as in the light. By this I know that all countries on the same ring have days and nights of the same length.

UNCLE. Very true, Charlie. Let us take a few cases. Look out lands all round the earth in our latitude. But you did not tell me your new name for parallels of latitude; for that is what we sailors call these lines.

CHARLIE. Parallels! what an odd word! What does it mean? I remember once going into Chalkton Infant School, and hearing children singing "parallel" something or other—I thought it was all nonsense.

UNCLE. These lines run alongside one another, each keeping its distance from its neighbour; there is always the same width between them as they run *alongside one another*. Parallel is one word for that; latitude means breadth;—on the globe it means distance north or south from the equator. But what is your new name for parallels of latitude?

CHARLIE. I call them "day-rings," because I see that the length of day at any place depends on how far it is from the equator; that is, on which of these rings passes through it.

UNCLE. Well, that also is not amiss. Let us now follow our own day-ring westwards across the Atlantic, and right round the world till it brings us home again. You will then know in what parts of the earth they are now having the same long days and short nights that we are having here at midsummer.

CHARLIE. The first land it brings me to is the north of an island, marked Newfoundland. Why, that must be where our dog Rover comes from! Thence we go from the east coast of Labrador, across the north of Canada, and over Lake Winnipeg. That must be where pastrycooks get ice from. I've seen the name stuck up in their shop windows. Now we go over these black furry lines—high mountains, are they not?

UNCLE. Right; over the Rocky Mountains.

CHARLIE. That's where the great grizzly bears live. Now we leave America and sail north of Vancouver's Island, and across the broad Pacific

Ocean. At last we reach the east coast of Asia, cross this large river marked Amoor; thence through Russia over another big river, the Volga, thence across Germany, and Belgium, and so home.

UNCLE. Well now, whenever you read of any of those lands, you will remember that their seasons and ours are the same and at the same time. What can you remember as to places as far south of the equator as we are north of it?

CHARLIE. They have winter when we have summer, summer when we have winter, spring during our autumn, and autumn during our spring.

UNCLE. Quite right. One Christmas Day which I spent off the Australian coast was as hot a day as I can remember spending anywhere.

CHARLIE. Will you now show me on the globe how you first sailed round the world? You won't mind if I ask questions as you go on?

UNCLE. The more the better, Charlie.

CHAPTER XVIII.

A VOYAGE ROUND THE WORLD.

IT was a dull November day when we sailed from Plymouth Sound.

CHARLIE. What does "sound" mean?

UNCLE. A shallow strait, or passage. First we made due south across the Bay of Biscay. There it came on to blow hard, and we were sadly tossed about. Many a gallant ship has gone down with all hands in those unfriendly waters. However, at last we rounded the cape, which the Spaniards call Land's End.

CHARLIE. I don't know what "cape" means. Stay, I can see by the map that it must mean a headland, like our Chalkness, or Dungeness—land jutting out into the sea.

UNCLE. Right; cape means head. But that Spanish Cape (Finisterre) is very high; they that love long words would call it a promontory. Bill, naze, ness, are all words for capes. Though then but a little lad like you, Charlie, I had no fear of the great deep. I loved to see its broad billows rolling and swelling around like the downs about our home here. Now we were down in the trough of the wave, seeing only foam all around; now we were lifted on high. Eh! but the feeling was grand! We now sailed westwards and called at St. Michael's, a lovely island, where groves of orange-trees spread for miles, as cherry orchards do in Kent. St. Michael's is not marked here, but it is in this group of islands called the Azores. Next week we spent galloping on ponies about the lovely, hilly, volcanic island, Madeira. Hence we sailed to another cluster of islands, called the Canary Islands.

CHARLIE. What where those pretty yellow singing birds come from?

UNCLE. Yes; off the north-west coast of Africa. There we landed, and went up the lofty peak of Teneriffe. It rises more than two miles high, right up from the sea. But if I go on talking about every place we stopped at I shall be talking till midnight.

CHARLIE. I hope you will, then; I could listen to you for ever.

UNCLE. We sailed southwards across "the line." Letters from home spoke of the hard frost and good skating they were enjoying in England, while we were being broiled by the sun over our heads. For all this time we had been sailing down the Atlantic. When we reached the Cape of Good Hope, at the south of Africa, we must have sailed six thousand miles. There, turning due east into the Indian Ocean, we made for the south of Australia. Which way do you think the shadows of our masts fell at noon, as we were sailing eastwards these six thousand miles across the Indian Ocean?

CHARLIE. Let me think. You were nearly as far south of the equator as we are to its north. At noon there the sun is in the north, because it is always over some part of the tropics. Then your masts' shadows pointed to the south. I have not forgotten that the sunlight fell through New Zealand Jim's *north* window, when it fell through my south window last March.

UNCLE. Quite right, Charlie. Well, we went through Bass's Straits to New Zealand. We were now in the South Pacific Ocean. By this time we had been away from old England about a year and a half, and I began to long for home. How I wished that some one had cut a canal across this narrow isthmus that joins the two Americas! We could then have steered north-east across the Pacific, threading our way among clusters of lovely coral islands and living on fresh cocoa-nuts. Then, after passing through the Panama canal, we should have had a merry time of it in the beautiful West Indies, eating pine apples and chewing sugar cane as much as ever we liked; and so home in half the time. Oh how I longed for that route! I shiver now when I think of the awful cold we met with on our way home from New Zealand round Cape Horn. There

> "Ice mast high
> Came floating by
> As green as emerald."

CHARLIE. Oh, you mean icebergs. Mary was reading me such a sad tale about them the other day, out of a book with lovely pictures. It was a story of some men who landed on an ice-floe to kill a white bear: the ice floated out to sea with the poor fellows. She read that icebergs have high peaks rising up like steeples. These break off and fall with a crash like thunder. Sometimes a whole berg topples over. Fancy if a poor ship were near one of these bergs when it toppled over. Why it would be crushed to splinters!

UNCLE. True: that has perhaps happened ere now. When it is fine weather even in a dark night icebergs are easily seen, if a good look-out be kept. But in a fog an iceberg cannot be seen till the ship is close upon it. Alas for the ship that strikes one bow on! She must be strong indeed to escape instant destruction. But then, in a chilling fog, an iceberg can be *felt*. Its nearness freezes the air. Did Mary's book tell you where these huge masses of ice come from, or how they are formed?

CHARLIE. It said that in lands round the poles snow falls instead of rain, and forms rivers of snow and ice instead of water. It called these streams by some name like glass.

UNCLE. Ice streams are called glaciers.

CHARLIE. That was the word. I remember it said these glaciers glide slowly down the valleys like thick tar, treacle, or molten glass, pushed on by the weight of snow and ice from the sides of the mountains. Slowly and steadily down they glide, grooving out valleys, as rivers chafe away their banks. When they are pushed out to sea their ends break off. Then great fields of ice, sometimes as large as a town, drift along towards the equator.

UNCLE. Quite true. The sea reminds me of a saucepan of cold water newly set on a hob. At the equator the boiling sun warms its surface. Now warm water is lighter than cold. So the warm sea water spreads out along the top of the sea towards the poles, and the heavier cold water running below takes its place. You may see like movements in our saucepan if you put some grains of rice or sago in, to show how the water goes round. Thus the sea water is always moving to and fro between the poles and the equator.

Icebergs drift along with the current, till, as they leave the poles, warmer water melts them slowly away. You have seen a lump of ice floating in water? Nine tenths of it is below the surface. If an iceberg towers two hundred feet above, the sea its bottom is more than a thousand feet below in the cold current.

CHAPTER XIX

SOUTHERN SEAS.

ALL this while I have been forg passage round Cape Horn. As bergs were floating all around. sheathed in ice; snow storms drov The cold was such that our frozen f work the ship. One day a man f iced yard-arm into the sea. Befor thing to save his life we saw a grea had been wheeling round the sh strong swimmer, and drive its l skull.

CHARLIE. Oh! what a sad end! at home must have mourned when wretched death! And his shipmat have pitied the poor fellow!

UNCLE. Yes, we all took it sorel was a brave, unselfish lad. Not o have given our lives to have save felt it most, as he had saved my life before.

CHARLIE. How? Do tell me al

UNCLE. We were lying at ancho south coast of Africa. It was very with other youngsters, was bathin deck watching us, when, with a sudden shriek, he yelled out to me to swim for my life, for a white shark was near. I struck out for the ship with all my might. I saw Smith jump from the deck in his clothes, with a cutlass in his teeth. Looking round I saw the back fin of the shark behind me. Smith swam up to me just as the shark drew near. Suddenly he dived past me. Getting below the shark, he plunged his cutlass into the creature's belly, then rose quickly, and helped me to scramble up into the boat. The sea was soon swarming with other sharks, drawn together by the blood of their wounded mate.

CHARLIE. Brave fellow! What a frightful death for you if you had been snapped asunder by the shark! Worse than poor Smith's, as he must have been stunned and lost all feeling.

UNCLE. We must now go on with our voyage, or we shall never reach home. Some other day I will tell you of the whales which sport in these seas. Let me see, I was speaking of the fiercely cold blasts from the South Pole, which froze our very marrow. As we sailed through the straits we anchored once for shelter in a creek.

CHARLIE. What is a creek?

UNCLE. A very narrow inlet. There we killed some seals, and got from them lovely soft furs. All around rose dreary, snow-capped mountains. Over the highest peak hung, like a cap, a strange-looking, white cloud. At nightfall we found this was a burning mountain. The strange cloud was smoke and vapour hanging over the crater.

CHARLIE. What is a crater?

UNCLE. The word means a bowl. It is the name given to the wide, open mouth of a volcano. It was grand to see the white and red-hot s down the sides of that snowy peak, a of smoke and showers of stones hu sky. But all this fire did not warm th bitterly cold. We were glad enough once more into the Atlantic, and bowl wards before the cold sou-wester.

CHARLIE. How odd it seems to th erly wind as cold!

UNCLE. Because you have never b northern clime of ours. To an Aust seem quite as strange to expect any from the south, and warm from the no

CHARLIE. That never struck me be the globe that on leaving England yo wards along the east of the Atlantic, back you sailed northwards along the same great sea.

UNCLE. Yes, from northern climes right round the world because most of earth lies north of the equator. It is onl as near to the South Pole as the north to the North Pole that a ship can sail earth from east to west, or from west ever you will. Quite lately, for the fi hardy Swedish seamen have sailed r of Europe and Asia, through the Arct the Atlantic to the Pacific. What a tance if that could become a regul North West Europe to North East A times men thought the sea a barrie land and another; now, we look upon ready made without cost of man's lab sea we take things which are plentiful other lands where they are scarce or wholly lacking, and bring back in return other things of which foreigners have too much, and which we lack.

CHARLIE. It is well for us English, then, that our waterway, the sea, is always open, and not frozen up as are other seas further from the North Pole than ours.

UNCLE. It is indeed, Charlie. I will tell you how it comes about that we have so little frost in winter, when countries far south of us are ice-bound. The sun over the middle of the Atlantic heats its surface water, which, flowing northwards, laps our island and keeps it warm in winter. Water takes long to heat, and long to cool. Thus islands having sea all around are cooled in summer, and warmed in winter by sea breezes. When we reached the line we were becalmed for some days. The heat of the sun in a copper sky, on a leaden sea, was fearful. How we longed for wind! and for want of being stirred the salt water began to stink. Were it not for winds the sea would soon become foul and unwholesome, just as without troubles we should soon become selfish and good-for-nothing. Well, at last, we sighted the shores of dear Old England. After three long years' absence I was glad to be once more at home; once more to be locked in my dear mother's arms; again to be petted by my sisters, and envied by my brothers and old school-mates.

CHAPTER XX.

MAP MEASURING.

ONE sultry afternoon as Charlie was coming home from Weston he saw black clouds gathering in the sky. Large drops of rain began to fall, and there was a rumbling of thunder far away. The sky became overcast. A flash of lightning, followed by a louder peal and heavier rain drops, quickened Charlie's steps. Running as fast as his little legs could carry him he reached the Coast-guard Station before the wet had soaked through his summer clothing, and dashed into his uncle's room. "Well, Charlie," said he, "here is a task that will help to amuse you whenever rain imprisons you here. Take my foot rule, a piece of thread, and this map of the world."

CHARLIE. In hemispheres? I always forget to ask what hemisphere means.

UNCLE. It means half-ball. If you were to cut an orange in two, take the peel off each half, press the said peel flat under a weight, and then put the two side by side like a couple of plates,—that would be somewhat like this Map of the World in hemispheres. It shows the earth's rind—the peel of the orange on which we live.

CHARLIE. Only our earth's rind is not so smooth as orange peel.

UNCLE. There you are quite wrong, Charlie. Why the highest mountain peak in the world is barely five miles and a half high, and few of the highest ranges run more than three miles high for any great length. What is that height to the thickness of the earth, eight thousand miles? The roughness of the smoothest orange peel is far greater, compared to its thickness, than the little pimples which we call mountains compared to our globe.

CHARLIE. But what was it you wanted me to do with the thread?

UNCLE. To measure the coast-lines of the different continents, by laying the thread along them and making it follow every bend and fold of the shore. When you have done that, you will find that countries having long coast-lines are in many ways far ahead of those whose shores are even. You are too young to know fully why this is so; but one reason, you as a sailor lad ought to see.

CHARLIE. There must be more shelter for shipping in a coast with many inlets.

UNCLE. Quite true, and so goods can be readily and safely brought in and sent out. Well now that is one thing you might with profit do on rainy days—measure the coast-lines of countries, and set down the numbers on paper.

CHARLIE. I shall enjoy doing that. The worst of it is that in Mary's atlas no two maps have the same scale. Thus England is made to look as large as France, which would make four Englands. Of course if one looks in the corner one sees that in her map of England an inch stands for thirty miles, while in her map of France it stands for ninety miles.

UNCLE. Well then you must multiply the French coast-line by three to compare it with the English. But at present you had better stick to maps of the world. You will then learn to compare one land with another as to size as well as position on the earth. You must not forget also those lines which you called "noon-rings" and "day-rings." You can always measure by them.

CHARLIE. So I do, uncle. I have found out much by my "day-ring" strips. But this puzzles me. The noon rings meet at the north and south poles. Thus places on different noon rings are further apart at the equator than anywhere else.

UNCLE. True, and the nearer you get to the poles the less far apart are places on different noon-rings. At the equator places one degree apart are 69 miles from one another. Where we live they are only 43 miles apart. All along the day-ring marked 60, the noon-rings are just half as far apart as at the equator.

CHARLIE. I shall not forget to use a thread for measuring on maps. One can make a thread follow the windings of a river or a boundary, then straighten and measure it on a foot rule, and so find out their length.

UNCLE. You must also bear in mind that a flat map cannot give a true plan of the round earth. If you cut off a slice of an old ball cover and squeeze it flat, as I said of the orange peel, the edges will split or stretch and the middle will be crumpled. The whole surface of these two round maps is just half that of a globe of the same size.

CHAPTER XXI.

RAIN.—MOUNTAINS.

As soon as the rain cleared off, Charlie and his uncle set out for a walk.

CHARLIE. Look what a heap of sand the rain has washed down the road!

UNCLE. Yes, and all in half an hour! Think what the brook must be bringing down, now that it is flooded by thousands of rills like these. Now think what even a small river made up of many such brooks must carry down every day—every week—every year!

CHARLIE. Enough to fill up the sea.—No; what nonsense I am talking; as there is three times as much sea as land, the sea is not likely ever to be filled up.

UNCLE. Mud and sand are being hourly brought down by rain. This waste does slowly wear away the land, level the hills, and form new land where once was sea. Thus slowly filled up in parts, the sea slowly rises and floods flat low-lying lands elsewhere.

You can see on this road how rivers are formed. Here, you see, trickles a little runlet of water; here another joins it; here a third. Now we have quite a streamlet flowing down the roadside. All the way along you see other rills joining, till, as you noticed, all this sand has been washed down to the bottom of the slope—quite a delta of sand.

CHARLIE. What is a delta, uncle?

UNCLE. You see this sand has three corners. Well a Delta was a three-cornered mark which the Greeks used for their letter D. When rivers bring down much soil from the hills into a flat plain they often form Deltas like this, and then their water runs into the sea by more channels or mouths than one, sometimes by many. You have read of the river Nile on whose banks Moses was found? That river, now known to be the longest in the world, enters the sea by many mouths. The Delta of the Nile has been pushed out northwards for many thousand years, filling up the sea with soil from the inner hills of that dark continent, as Africa is often called.

CHARLIE. Why do they call it dark? I suppose because the negroes of Africa have black skins.

UNCLE. More likely because the whole country is little known, and so dark to us; or because it is in darkness, and has as yet but little of the light of truth and knowledge that is now daily spreading over the earth and lighting up all its dark places.

CHARLIE. Look, uncle, how the road steams now that the sun is shining.

UNCLE. True; in a little while these puddles will all be dried up.

CHARLIE. Oh, I know; like the steam from the tea-kettle on the hob.

UNCLE. Yes; the puddles are being warmed into vapour. That is what the clouds yonder are made of. Nothing is wasted. Not a drop of rain that falls is lost. Most of it runs down to the sea.

CHARLIE. Then how is it that the sea does not become too full and overflow the land?

UNCLE. Because the hot sun is always turning into vapour the surface of the sea as well as other water in the warmer parts of the earth. This vapour forms clouds, and when clouds are cooled they drop as rain. Sometimes the lower air is so cold that it freezes the rain-drops into hail before they reach the earth. Sometimes the upper air is so cold that the vapour is frozen before it falls, and then we call it snow. I remember once, when I was on a high mountain with a friend, thick clouds formed below us and hid the smiling valley from our view. When we went down into the cloud it was snowing. Lower down we met sleet,—half-rain, half-snow. At the foot of the mountain it was raining. It is always colder on a hill-top than on the low ground at its foot.

CHARLIE. That is well for those who live in hot countries. I used to think it must be hotter the higher one mounted because one was getting nearer to the sun.

UNCLE. Very natural to think so, when you had no idea of the millions of miles the sun is from us, and what a mere nothing the thickness of the earth is to that great distance. In a balloon the higher you rise the greater the cold. If it were not for the mountains in countries near the equator the heat would often be past bearing. When men cannot bear the heat in the scorched plains they go up high mountains, where it is always cooler. In all parts of the earth there is a certain height, called the snow-line, above which snow never melts, however hot the sun. It is a very happy thing for mankind that much of the land in the torrid zone is very high. Thus a great part of Central Africa is a table-land, raised nearly a mile above the sea, and thickly peopled. In Mexico is a high plateau some eight thousand feet, or a mile and a half above the sea level.

CHARLIE. Ah! *now* I understand why Mr. Smith was so pleased to learn that his son, out in India, was stationed on the Hills. It must be so much cooler and healthier.

UNCLE. Yes, in a mountainous tropical country you may have all climates. On the hot plains you find cocoa-nut and other palm-trees, pine-apples, sugar-canes, spices and bamboos. A little higher, rice, tea and coffee plantations flourish; yet higher, vines, maize and evergreens; higher still, wheat, fruit-trees, and forest-trees; higher again pines and other firs, then birch-trees. At last we come to where nothing but mosses and lichens grow, and then to eternal snow. Thus we have the same changes of climate in going up a mountain at the equator as in going from the equator to the north or south poles.

CHARLIE. But, uncle, I see that Labrador and England are both on the same day-ring. Now I have read that Labrador is very, very cold. How is that? Oh, I remember you told me that islands always have more even climates than continents, because water parts with its heat very slowly.

CHAPTER XXII.

TIME.

NEXT time Charlie met his uncle, he said,—

"I have been thinking over your saying 'It is always sunrise, noon, sunset, or midnight somewhere on the earth's surface.' Since the earth takes twenty-four hours to spin right round, she must take twelve to spin half-way, and six for a quarter-way. Now. I see numbers marked where the noon-rings on the globe cross the equator. Our noon-ring is marked 0 on this side, and 180 on the other side of the globe. Midway on each side is a noon-ring marked 90. Since, then, the earth takes six hours to carry 0 to where 90 was, and 90 to where 180 was, in *one* hour she must carry 0 to 15."

UNCLE. That is all quite true, Charlie. The earth rolls through fifteen degrees, as we call them, every hour. Thus we can reckon the time at any place of which we know the longitude. Suppose you now try to find the time at a few places by marking the noon-rings which pass near them. We will begin with the east. It is now noontide with us; what o'clock is it in the Bay of Bengal?

CHARLIE. Oh, that is an easy sum, for 90° east passes down it. The earth has turned through a quarter of her daily course since it was noon there; so it must now be just six in the evening.

UNCLE. Right; the sun will soon be setting there, and, as it is within the tropics, what will happen then?

CHARLIE. It will become dark almost at once, because there is scarcely any twilight there. Tigers will soon be prowling about near the water's edge, to catch deer as they come down to drink.

UNCLE. In what part of the earth is it now four o'clock in the afternoon?

CHARLIE. Let me think! four times fifteen are sixty. The noon-ring numbered 60 passes along these mountains between Europe and Asia.

UNCLE. Right; it is now four o'clock in the Ural Mountains. Let us now look westward. What o'clock is it in New York? Its longitude is about 75 west.

CHARLIE. In seventy-five there are five fifteens. It will therefore take the earth yet five hours to bring New York to noon. Five hours before noon is seven o'clock in the morning.

UNCLE. True. If I "wire" to a friend at New York, my message will be there in less than no time.

CHARLIE. How so?

UNCLE. Suppose I send my message at twelve, and it takes an hour on the road, when will it reach him?

CHARLIE. I see now! It will reach him at eight—four hours before you sent it! How odd that must sound to those who do not understand it.

UNCLE. You see then that all places fifteen degrees to the *east* of us are one hour *before* us in time, and that places as far to the *west* are an hour *behind* us. How long does the earth take to spin one degree?

CHARLIE. Fifteen degrees in sixty minutes, three in twelve, one degree in four minutes.

UNCLE. Right. At the equator the earth spins at the rate of above seventeen miles in a minute. In four minutes, then, she would travel above four times seventeen miles. Now a degree at the equator is about sixty-nine English miles.

CHARLIE. Why at the equator? Oh! I remember, the noon-rings all meet at the poles. Thus the space between them vary from sixty-nine miles to nothing.

UNCLE. Just so. That part of the earth on which we dwell does not spin nearly so fast as the equator. *There* the earth spins so fast that the air, unable to keep pace with it, lags behind, and thus makes the "trade winds." These are winds which seamen always know when and where to meet. They blow steadily one way, wafting ships without delay over the wide sea.

CHAPTER XXIII.

PLANETS.

CHARLIE. Uncle, I have often meant to ask you how the earth is kept up, as it travels spinning round the sun?

UNCLE. I thought you would be asking me that some day. I fear you will have to wait till you are much older before you can hope to understand it. Do you see yon bright star rising over the windmill? That also, like the earth, is a roamer round the sun. Yon star setting behind Dungeness is another planet, and there are many others, some greater, some less, which wheel day and night without ceasing round the sun, spinning as they speed along.

CHARLIE. Then they too have days and nights as we have?

UNCLE. Yes; and perhaps seasons, for they all travel as we do somewhat aslant. Two of them are as much larger than our earth, as a large and a small orange are than a pea; and have one four, the other eight moons wheeling round to light them by night.

CHARLIE. And do they travel as quickly as we do?

UNCLE. The largest planet (large enough to make thirteen hundred earths) spins more than twice as fast as the earth. Even at the equator the earth spins only at the rate of seventeen miles in a minute.

Charlie. Seventeen miles in a minute! why I wonder we are not all of us, houses and everything, hurled off as the water when one trundles a mop.

Uncle. Look at the hands of the clock. You know that the large hand goes all round once every hour, and that the short hand takes twelve hours to go once round. Well if your eyes are good enough to see the long hand moving, you certainly cannot see the short hand move, can you?

Charlie. No, indeed!

Uncle. Now, the earth takes twice as long as that to roll once round.

Charlie. Yes, I remember, it takes twenty-four hours to roll round. How many miles is it right round the earth?

Uncle. Nearly twenty-five thousand at the equator. Thus every hour the earth has there to roll more than a thousand miles an hour. It would take a train five weeks to go round the earth if it went thirty miles an hour day and night without stopping.

Charlie. You once told me that the sun was as much larger than the earth as an orange is than a tiny seed. Is the moon too as large? It looks as big.

Uncle. Oh, dear, no! The moon is far smaller than the earth, but it is not so far away as the sun is. More than a million earths could be made out of the sun. Fifty moons might be made out of the earth.

Charlie. And how many stars could be made out of the moon? I've heard Widow Jones say the old moons were cut up to make stars!

Uncle. Why, my dear boy, the stars are mostly great suns so far away that if a new star were now created, years would pass before its light could travel through space to reach our eyes and enable us to see it. If one of them were destroyed, years would pass before its light ceased to twinkle. Such a thing has really happened more than once. A star has blazed up, burnt out, and been seen no more!

CHARLIE. What an awful thing to think of!

UNCLE. Ay, Charlie, you know the psalm "The heavens declare the glory of God." There are few things more solemn than to sail for days together over the great deep, and to watch the countless stars rise and set as one keeps watch on deck at night. They that go down to the sea in ships see the wonders of the sky as well as of the deep. Alone with God, we hear His small, still voice speaking to us in the night-watches.

CHARLIE. What a grand sight it would be to be set somewhere so that one could see the earth rolling round the sun! How fast does it travel?

UNCLE. Every minute it speeds more than a thousand miles on its way, every second more than eighteen miles. But figures like these are mere words to us. We can neither see nor feel the earth's motion. You may form some faint idea of a heavenly body's motion from a sling. As long as you keep the sling whirling round your head the stone is held tight. Let go the string and off flies the stone. The string is as the sun drawing in the planets, which else would fly off—who knows where?

CHAPTER XXIV.

AN ECLIPSE.

UNCLE. There is to be an eclipse of the moon to night. This will give you proof of the earth's shape, and of the motions of the heavenly bodies.

CHARLIE. Why what is an eclipse ?

UNCLE. You know the moon goes round the earth in a month, just as the earth itself goes round the sun in a year. The word month, of course, comes from moon. Now the moon has no light of its own. It is a cold, dead body that sends back light which it gets from the sun. When it is full moon the side of the moon facing the sun is turned towards us. The earth is then between the sun and the moon. Sometimes the earth is so exactly between the sun and the moon as to keep all sunlight from the moon. The earth's shadow then passes over the moon's face. Take my glass and look now at the moon. What do you see ?

CHARLIE. It looks like a shilling with a bit clipped out of its edge.

UNCLE. That is the earth's round shadow just beginning to pass over the moon.

CHARLIE. If any folk live in the moon, how must the earth look to them ?

UNCLE. That we cannot say for certain; but it must look just four times as broad as the moon looks to us.

CHARLIE. Why you said fifty moons could be made out of the earth.

UNCLE. True: but for all that the axis of the earth is only four times that of the moon. Just take two cubes of soap, one of them with sides of one inch, the other with sides of two inches each. Well, then, one is half the breadth of the other. Yet eight cubes with one-inch sides may be cut out of the two-inch cube of soap. A four-inch cube would make sixty-four one-inch cubes. Thus you will readily believe the earth would make fifty moons. The surface of the sun is more than eleven thousand times that of the earth, yet more than a million balls as large as the earth could be made out of the sun.

CHARLIE. What a strange, coppery line is now coming over the silvery moon! The shadow seems darker than before.

UNCLE. Yes, the light of the sun is now wholly kept from one edge of the moon; before, only part of its light was screened by the earth. Had we been standing on that part of the moon when the shadow of the earth first began to fall upon it we should have seen the sun looking much as we lately saw the moon. Were we there now we should see no sun at all.

CHARLIE. Could the earth have been seen from the moon before the eclipse?

UNCLE. I think not, because that side of the earth on which the sun is now shining is turned away from the moon. The earth can only be well seen from the moon, I should think, when the moon is between the sun and the earth. Then the dark side of the moon sees the earth in the full blaze of sunlight, while it is itself on that side in the dark.

CHARLIE. Does the moon never pass between the sun and the earth so as to keep the sun's light off the earth?

UNCLE. Now and then, but only from a small part of the earth at a time. I remember that happening once when I was a boy. It was a bright, sunny day. About two o'clock in the afternoon the moon began to come between us and the sun. We all had pieces of smoked glass with which to look at the sun. The birds went to roost as soon as it grew dusk, and the dogs seemed sorely puzzled.

CHARLIE. I wonder which part of the earth looks brightest from the moon; I should think the Pacific Ocean. Because, when I look down from the cliff, the sea always looks brighter than the land. And after rain the puddles are like looking-glasses all over the road. Thus, as water looks brighter than land, I suppose the broadest sheet of water on the earth will look brightest from the moon.

UNCLE. You forget clouds. I have been up on high mountains and seen clouds under my feet hiding all below. When the earth is not cloud-wrapt, the ice and snow about the Poles must look brightest from the moon, and her seas darker than her lands. Well, now that the moon is all hidden by our earth's shadow, I think we had better do as the birds did during the eclipse of the sun—go to roost.

CHAPTER XXV.

THE EARTH IN SPACE.

NEXT morning when Charlie came down to breakfast he said to his sister,—

"Oh, Mary, I have had such a beautiful dream! I thought that a sweet face watched me as I lay asleep. The eyes were like yours, but their look was, oh! so tender and loving, that my heart went out to her, and I felt that I could follow her anywhere for ever."

MARY. It must have been our dear mother whom you saw in your dream.

CHARLIE. It was like her portrait; but I cannot remember her living face. Well! she beckoned me to follow, and at once I arose to obey. The window was open, and we passed out into the soft summer air. We seemed to glide along noiselessly, floating without effort. The moon was just passing out of the earth's shadow, and flooding the sea with its silvery light. Up we floated, light as air. I felt no fear, though I saw seas and lands ever so far below me, and here and there clouds rolling along. At last we saw the earth growing smaller, and the moon larger. As we drew nearer to the moon we saw its face pitted with hollows in the hills, and high mountains throwing black, sharp shadows. We had now passed out of the earth's shadow into sunlight. We saw the sun lighting up one side of the earth, while the other lay still in shadow. Gazing at this strange sight I saw that the whole earth was as a huge ball, rolling slowly round. Fresh seas and lands every moment kept coming into the light, others passing into the dark. Farther and farther we floated along in a flood of sunlight, till at last the earth seemed only a star with the little moon alongside of it. Then I saw other stars like the earth wheeling round the sun. Looking away from the sun, I now saw, oh! such a huge moon! It was spinning more than twice as fast as the earth, and speeding on through space faster than the cannon-balls that we have seen them firing at Hythe. Awestruck I drew near to my guide; but her calm look drove away all fear. Then I bethought me of that large planet of which Uncle George spoke as travelling round our sun, and large enough to make thirteen hundred earths. I remembered then that he had told me that the sun, a thousand times larger than its largest planet, draws them all; so that they go on ever wheeling round him, and cannot dash one against another, nor roam away and be lost. As we floated still onward this mighty planet grew smaller. Soon we sighted another huge ball, spinning and speeding along. It was begirt with three shining rings. They were like the glory round St. Paul's head in the window of our church. That too was a planet which uncle had told me would make nine hundred earths. The sun now looked as small as a pea. Growing smaller and smaller, it became at last only a bright star. Then I saw everywhere all around nothing but stars, many of them far brighter than our sun. Still we floated on. At last we saw two suns, one bright blue, the other glowing orange. These were wheeling round each other, and each had great balls rolling around it, as the planets round the sun. Next I saw another pair of suns, one red, the other green—oh, so beautiful! Then I awoke and heard you calling to me to get up.

MARY. What a strange dream, Charlie! It shows what a hold Uncle George's talk about the stars has had upon you! I always dream of things that I think about very much. But here comes Uncle George.

UNCLE. Good morning, my dears. You remember my telling you the other evening that we have one set of stars overhead at midnight in spring, another in summer, a third in autumn, and yet a fourth in winter. I showed you by the four walls of this room that by this we know that the earth journeys round the sun. Well, I have brought you here some star maps. These are our spring, these our summer, these our autumn, and these our winter stars; and if the sun could hide his light from us here, as he does at the poles, we should see all four sets of stars in the twenty-four hours, as we spin round. As it is, the earth takes three months of its journey round the sun to show us stars which could be seen after six hours of her spinning. If we could hide the sunlight at noon in summer, we should see the winter midnight stars then shining overhead. If we could do the same in spring, we should then see the autumn stars overhead at noon. I have marked under each star map the days and hours at which you may see these stars overhead. What are seen at midnight in midsummer may be also seen in the early mornings in spring time, and in the evenings in autumn. What are seen at midnight in autumn may be seen in the evenings in winter, and so on of the rest.

CHARLIE. How I should like to study the stars!

UNCLE. When you grow to be a man you may do so perhaps; but as long as you are a little boy, you will have first to learn all about this lowly earth on which we are placed. If we do our work well here, we may some day see and learn what no one has ever dreamt of.

MARY. There, Charlie! now tell uncle your strange dream.

CHARLIE. My dream took me far beyond the sun, among the other suns which we call stars. Now that I know there are countless other worlds, having seen them with my own eyes in my dream, I am all the more keen to study the surface of our own little earth.

THE END.

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